EDISON ELECTRIC INSTITUTE BULLETIN

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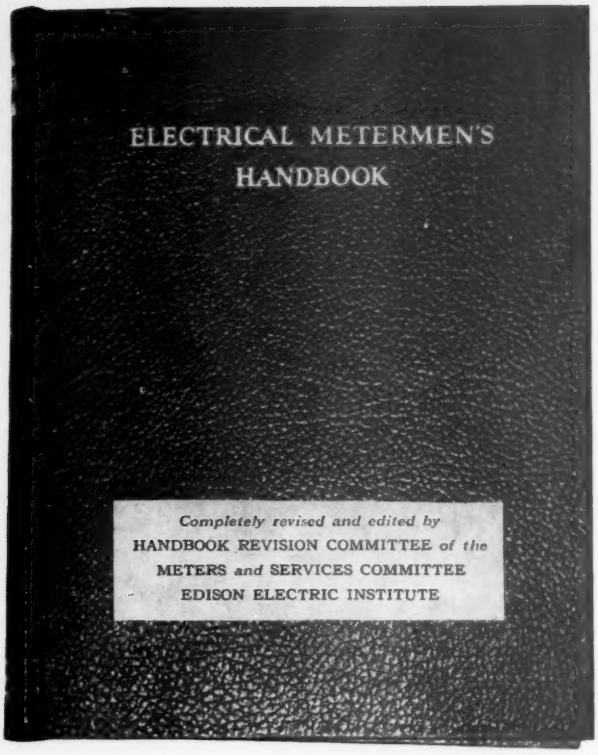

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume 8 MARCH, 1940 No. 3

The Electric Utilities Stake in Experience-Rating Under Unemployment Compensation Laws

THE electric utility industry is one of the nation's big employers. It has an annual payroll of 450 million dollars; its average annual wage is high because the regularity of its employment is far above average. Except for minor fluctuations in payrolls related to construction of new facilities, the industry has thrown little burden of unemployment upon the nation.

There is probably no major industry which has less need for unemployment compensation legislation, yet the industry favors such legislation in principle and is willing to support it financially and otherwise. Its only concern is that its share of the cost burden be equitable —in proportion to its share of unemployment.

The only practicable means of bringing about a fair sharing of the burden of unemployment compensation is known today as EXPERIENCE-RATING—a provision in unemployment compensation laws which will permit the rate of taxes levied on payrolls to go up or down depending upon the individual employer's unemployment compensation experience.

If an employer were required to pay premiums for accident compensation insurance at the same rate as all other employers, regardless of the degree to which he had adopted accident prevention devices and methods and completely ignoring actual accident experience, he would be fighting mad.

No individual or group would seriously consider promoting legislative changes to impose a flat insurance rate for accident compensation on all employers, not so much because a flat rate would be wrong in principle as because they know that the opposition to such changes by business would be overwhelming. However, some groups are very actively promoting legislative changes which would impose a flat payroll tax rate on employers for the support of unemployment compensation, regardless of the degree to which employment has been stabilized and completely ignoring actual employment experience. In other words, they are seeking to destroy EXPERIENCE-RATING which will permit the unemployment tax rate to go up or down depending upon employment experience and hazard, exactly as accident compensation insurance rates go up or down depending upon accident experience and hazard.

They hope to repeal experience-rating provisions now present in state unemployment compensation laws and the provisions of federal laws and revenue codes which recognize experience-rating for federal payroll tax credits, before large numbers of employers have an opportunity to become aware of its benefits through tax reductions.

NOTES ON THE JUNE CONVENTION

THE program and the plans for the entertainment of those attending the E.E.I. Convention to be held at Atlantic City, June 3-6, are rapidly being completed, and will be announced in some detail in the April issue of the BULLETIN.

The Convention will be held in the Atlantic City Auditorium. Six general sessions and a luncheon meeting are scheduled for Convention week. Registration will open Monday, June 3, and this day will be reserved for committee meetings and informal gatherings of delegates. Two business sessions will be held Tuesday, June 4, one in the morning and one in the afternoon. Three sessions—morning, afternoon and evening—will be held Wednesday, June 5. The concluding sessions will be a morning session and a luncheon at the Hotel Traymore, Thursday, June 6.

Entertainment to be provided for the leisure moments of the Convention will include dancing in the Fountain Room and Terrace of the Traymore on both Monday and Tuesday evenings, a tea for the ladies on Tuesday afternoon and a special program to be provided by well-known artists during the Wednesday evening session.

Hotel and transportation information circulars and reservation blanks will be mailed to member companies the latter part of April.

Unfortunately experience-rating cannot become operative in most states until 1941 or 1942. Because of this, employers, in general, have little or no factual proof of the advantages it holds for themselves and their employees, nor do they have pointed arguments to encounter the widespread charges that experience-rating is impracticable; will bankrupt unemployment reserves and is a device to discriminate in favor of a few employers at the expense of the many.

From actual operation of the Wisconsin Unemployment Compensation Law for more than five years and operation of experience-rating for the calendar years 1938 and 1939, enough facts are available so that employers, generally, can draw their own conclusions as to the future worth of experience-rating as applied to unemployment compensation.

The Wisconsin Unemployment Compensation Act became a law on Jan. 29, 1932—long before Social Security or similar legislation in other states. The Act, in its declaration of public policy states, in part, "The economic burdens resulting from unemployment should not only be shared more fairly, but should also be decreased and prevented as far as possible. A sound system of unemployment reserves, contributions and benefits should induce and reward steady operations by each employer, since he is in a better position than any other agency to share in and to reduce the social costs of his own irregular employment. Employers and employees throughout the state should cooperate, in advisory committees under government supervision, to promote and encourage the steadiest possible employment." No emergency stuff there. The legislature's declaration that such a law SHOULD INDUCE AND REWARD STEADY OPERATIONS BY EACH EMPLOYER embodied all of the nation's best thinking—employer and labor—on ways and means by which government might most effectively act to reduce unemployment. The underlying principle had been distilled from several years of continuous effort, in which organized labor took prominent part, to enact unemployment compensation legislation in Wisconsin.

The framers of the Wisconsin law reasoned that if employers could be shown in simple arithmetic that by regularizing work and stabilizing employment their profits would increase because of lower taxes, they would put forth earnest effort to reduce unemployment, whereas without this incentive a continuing unemployment tax would become merely another expense burden on production which, through higher cost of goods and services, might even reduce employment in the long run. Unless and until someone invents an effective substitute for the PROFIT MOTIVE, the old appeal to the employer's pocketbook is going to solve more unemployment problems than all the tax laws on the books. That is just plain common sense. There are more cases than anyone would care to record which show that when employment stabilization will reduce costs, particularly taxes, employment has been stabilized but no one has produced evidence that a continuing, irreducible tax burden ever increased employment, except in the tax collector's office. Individuals and organizations earnestly and honestly seeking to reduce unemployment, will find that their future success will be in direct proportion to the degree to which they offer employers a definite financial incentive to work with them. That incentive today is known as "EXPERIENCE-RATING." Sociologists won't like this, but after all employers are only behaving like human beings.

The Wisconsin law is primarily of the employer-reserve account type but in order to safeguard the payment of benefits to employees of those employers whose experience is not so good, the law has a separate pooled fund known as the "balancing account." This "balancing account" is a repository for all earnings on unemployment reserve funds invested and, in addition, all individual employer-reserves are assessible to maintain the "balancing account" at a figure in excess of half a million dollars. No such assessment has been necessary, in fact, after all potential charges had been deducted the "balancing account" showed a net increase of about $1,200,000 during the year 1939.

The machinery of experience-rating in Wisconsin is geared to the employer-reserve accounts. These accounts are, of course, not "funds" but rather a bookkeeping convenience for the operation of the particular variety of experience-rating used in Wisconsin.

1. Each employer's contribution (taxes) are credited 100 per cent to his separate account in the state Unemployment Reserve Fund.

2. All benefits paid to his workers, based upon past employment by him, are charged currently 100 per cent against his account.

3. The employer's contribution rate for any calendar year will go up or down depending upon his own unemployment benefit experience as revealed by his "account." The index is his "reserve percentage."

4. The employer's "reserve percentage" is calculated as the relation of the net balance in his "account," as of December 31, to his taxable payroll for the same calendar year (or to his three-year average taxable payroll if such average is higher than the current year payroll).

5. If the "reserve percentage" is 4 or more but less than 7½ per cent, contributions for the ensuing year are payable at the standard rate of 2.7 per cent of payroll.

If the "reserve percentage" is 7½ or more but less than 10 per cent, the contribution rate drops to 1 per cent of payroll.

If the "reserve percentage" is 10 per cent of payroll or higher, no contributions are required for the calendar year.

If the "reserve percentage" is less than 4 per cent, contribution rates ranging from 3.2 to 4 per cent of payroll are payable until this situation is corrected.

The Wisconsin employer likes the reserve account idea because it tends to personalize the operation of the unemployment compensation law by providing a direct incentive to avoid a drain on "his" reserve account and relates his payroll tax rate to the net balance in "his" account. The reserve account set-up, however, is merely something geared to experience-rating and has nothing whatever to do with the principle of experience-rating. Experience-rating is just as practicable under a "pooled fund" law and can be operated in a number of different ways. While the Wisconsin employer likes "his" reserve account system, he doesn't give two whoops whether employers in other states have it or not. He is concerned, however, lest other states throw experience-rating overboard.

Now how has experience-rating operated in Wisconsin? Has it benefited employers? Has it resulted in insufficient funds? Has it worked to the detriment of unemployed persons?

To answer the last question first, no unemployed person has failed, because of insufficient funds, to receive unemployment benefits to which he was entitled and for which he applied. In addition to ample funds represented by individual employer reserve accounts, the "balancing account" takes care of all overdrafts.

So far as adequacy of funds is concerned, 1938 was a year marked by serious unemployment in Wisconsin, but in spite of benefit payments to unemployed persons, totaling about 9½ million dollars, the Wisconsin Unemployment Reserve Fund at the end of 1938 showed a net increase of about 7 million dollars. The net balance at the end of 1939 was $50,495,433, having increased another $11,000,000 during that year.

Has experience-rating benefited employers? A reduction from the standard contribution rate to a 1 per cent rate means an earned tax reduction of 63 per

cent. For the year 1940, more than 58 per cent of Wisconsin employers earned this or a greater reduction.

Under the law, an employer's account is not liable for payment of benefits until contributions have been payable for 24 months nor is an account eligible for experience-rating until benefits have been payable for another 12 months.

At the end of 1938, there were 7264 active employer-reserve accounts which met this requirement and on the basis of "reserve percentage," the 1939 contribution rates assigned were distributed as follows:

Contribution Rate % of Payroll	Number of Employers	Per Cent of Employers
3.2%	676	9.31
2.7% (Standard)	3725	51.29
1.0%	2473	34.04
Zero	390	5.36
	7264	100.00

Hence, as early as 1939, 2863 employers or 39.4 per cent of those whose accounts were eligible for experience-rating paid contributions at lower than the standard rate.

At the end of 1939, there were 8242 active employer-reserve accounts eligible for experience-rating and the approximate distribution of contribution rates is currently as follows:

Contribution Rate	Number of Employers	Per Cent of Employers
3.7%	183	2.22
3.2%	328	3.99
2.7% (Standard)	2902	35.21
1.0%	3966	48.11
Zero	863	10.47
	8242	100.00

Thus, in spite of an increase of nearly 1000 eligible accounts, the percentage of employers who earned contribution rates below the standard rate increased from 39.4 in 1939 to 58.58 in 1940 and the number of employers on the lower rates increased from 2863 to 4829, also, the number of employers paying at higher than standard rates was reduced from 676 in 1939 to 511 in 1940, although a small number of employers in this group went to a 3.7 per cent rate, due to the operation of changes recently made in the law.

On the basis of the total taxable 1939 payroll of all employers subject to the Wisconsin law the standard tax rate of 2.7 per cent would have required total employer contributions of about $18,000,000. Contributions actually paid were $13,600,000 so, in total, experience-rating saved Wisconsin employers approximately $4,500,000 for the year 1939. Estimated employer savings for the year 1940, with approximately 58 per cent of employers on lower than standard rates, exceed $5,000,000. Estimates of potential future savings run as high as $12,000,000 per year. If this entire potential saving to employers had been achieved in 1939, the Unemployment Reserve Fund would still have shown a net increase of more than a million and a half dollars after all benefits had been paid to unemployed persons—an indication that experience-rating does not endanger adequate provision for payment of unemployment benefits.

The above favorable showing as to the number of employers earning reduced contribution rates through experience-rating is not confined to traditionally stable industrial groups, in fact statistics published by the Industrial Commission of Wisconsin on contribution rates applicable to employers in all branches of industry explodes the tradition that some branches of industry are inherently stable while others are inherently unstable. Some employers in traditionally stable industries are paying contributions at rates above standard, while many employers in such traditionally volatile industries as mining, quarrying and construction are paying at the rate of 1 per cent of payroll or not at all. The much maligned manufacturing group in 1939 was about 40 per cent on less than standard rates and the 1940 figures will probably show a larger number of manufacturers, in all lines, who have earned lower than standard rates.

While it is true that employment in some companies is more stable than in others, the above facts are a direct contradiction to statements by the opponents of experience-rating who would have us accept their defeatist philosophy that unemployment is beyond the control of industry and who charge that experience-rating is a device to favor a few inherently stable business institutions at the expense of the great mass of employers. The official statistics on experience-rating in Wisconsin show that there is no important industrial group where experience-rating is not of actual or potential value to its employers.

Now, what does experience-rating look like from the viewpoint of the utility industry in Wisconsin. In the three principal groups distribution of employers by contribution rates for the year 1940 is shown in the next column.

Out of 102 employers classified under the three principal public service groups only 12 are paying contributions at the standard rate, 70 are paying at the rate of 1 per cent and 20 are paying no contributions, their "reserve percentages" having exceeded 10 per cent.

	Number of Employers on Various Contribution (Tax) Rates			
	2.7%	1.0%	Zero	Total
Electric and Gas Utilities	5	26	4	35
Telephone, Telegraph and Related Services	7	39	12	58
Street, Suburban and Interurban Electric Railways and Bus Lines	—	5	4	9

The latest published data available show that from the beginning of contributions under the Wisconsin law and continuing through June 30, 1939, these 102 employers had paid a total of $3,019,404 in contributions to the state with benefits paid to their unemployed totaling only $147,775. Benefits paid over a period of about three years amounted to less than 5 per cent of contributions paid to support such benefits or, stating it another way, more than $20 of contributions were paid in for each dollar paid out as benefits. Since these figures cover the longest period of benefit payments under unemployment compensation laws in the United States, they will probably be distasteful to those who claim that experience-rating endangers the rights of the unemployed to receive all benefits payable.

Some data for electric utilities alone are not available and since several Wisconsin utilities serve the public with both electricity and gas, these groups have been combined by the Industrial Commission of Wisconsin for statistical purposes. Published data for this combined group show that up to and including June 30, 1939, the electric and gas utilities had paid $1,496,258 in contributions with unemployment benefits paid totaling $105,438, a ratio of about $14 in contributions paid in for every dollar of benefits paid out. Such a margin of safety borders on the ridiculous even under Wisconsin experience-rating but think of what the situation would be if no experience-rating were effective. At least current taxes on Wisconsin utilities for support of unemployment benefits are being rapidly reduced.

The total annual Wisconsin payroll of other than municipally operated electric and gas utilities and city, suburban and interurban electric railway and bus lines is about $21,573,000. This payroll by class of service is shown in Table I, together with figures showing what the employer contributions would be at the standard rate of 2.7 per cent of payroll and at the rate of 1 per cent, which is the prevailing rate today.

Thus, the difference in payroll taxes under the Wisconsin Unemployment

TABLE I

	Annual Taxable Payroll $	Annual Contributions Required at 2.7% of Payroll $	Annual Contributions Required at 1% of Payroll $	Difference $
Electric Utilities	12,885,000	347,895	128,850	219,045
Gas Utilities	3,326,000	89,802	33,260	56,542
Electric Railway and Bus Companies	5,362,000	144,774	53,620	91,154
	21,573,000	582,471	215,730	366,741

Compensation Act at 2.7 per cent (which is the prevailing state rate where no experience-rating is operative) and 1 per cent means an annual saving of more than $366,000 to the above groups and $219,000 to electric utilities alone. Without the benefit of experience-rating an item of expense as large as $219,000 per year for electric utilities in Wisconsin would be a factor in the cost of furnishing service to the public.

The total annual payroll for the electric utilities in the United States is said to be about $450,000,000. Unemployment Compensation taxes under state laws at 2.7 per cent of payroll would total $12,150,000 per year with another $1,350,000 to the federal government. Experience-rating which would permit a rate as low as 1 per cent would save the industry nearly 8 million dollars per year. Laws which would permit the tax rate to drop to zero for very stable employment would eventually save the industry most of the 12 million dollars per year—an important factor affecting rates to electric service customers.

As stated above, while Wisconsin and one or two other states have the employer-reserve account type of law, all such features are not essential in experience-rating. The principle of experience-rating is present today in the unemployment compensation laws of 39 states, most of which are "pooled fund" laws. These experience-rating provisions will become operative within the next year or two unless destroyed by amendments passed by state legislatures or by amendments to the Social Security Act or Internal Revenue Code passed by Congress which virtually compel changes in state laws.

For the near future, the important thing is to keep experience-rating provisions in those state laws where they now exist and to get such provisions written into the other state laws. That sounds easy, but just to keep present experience-rating provisions will require the eternal vigilence of interested employers and possibly a struggle. If so, it will be a struggle for something worthwhile; for a principle which has been proved in spite of baseless contention that it could not operate satisfactorily; for a plan which contains the only known device for enlisting a large number of employers in a drive to stabilize employment and a plan which, in the long run, will prove beneficial to both employee and employer.

Judges for Prize Awards Are Announced

H. P. LIVERSIDGE, Chairman of the E.E.I. Prize Awards Committee, has announced the appointment of judges for 1940 of six of the Prize Awards administered by the Institute. They are as follows:

B. C. FORBES AWARD

G. W. VANDERZEE, Wisconsin Electric Power Co., Milwaukee Wis.

T. D. CROCKER, Northern States Power Co., Minneapolis, Minn.

ROY PAGE, Nebraska Power Co., Omaha, Neb.

McGRAW AWARDS

H. R. WOODROW, Consolidated Edison Co. of New York, Inc., New York, N. Y.

FRANK R. INNES, *Electrical World*, New York, N. Y.

W. A. SHOUDY, Orrok, Myers and Shoudy, New York, N. Y.

THOMAS W. MARTIN AWARD

G. W. KABLE, *Electricity on the Farm*, New York, N. Y.

Col. W. H. MUMM, Mumm, Romer, Robbins & Pearson, Inc., Columbus, Ohio.

(Third member to be appointed.)

R. B. MARSHALL AWARDS

L. E. MOFFET, *Electrical Merchandising*, New York, N. Y.

J. H. NELSON, Ralph H. Jones Co., New York, N. Y.

FRANK E. WATTS, *Electrical Dealer*, Chicago, Ill.

GEORGE A. HUGHES AWARDS

KENNETH DAMERON, Committee on Consumer Relations in Advertising, New York, N. Y.

H. G. DOOLEY, *Electrical World*, New York, N. Y.

RALPH H. JONES, Ralph H. Jones Co., Cincinnati, Ohio.

CHARLES A. COFFIN AWARD

C. W. KELLOG, Edison Electric Institue, New York, N. Y.

KARL TAYLOR COMPTON, Massachusetts Institute of Technology, Cambridge, Mass.

H. P. LIVERSIDGE, Philadelphia Electric Co., Philadelphia, Pa.

Judges for the Augustus D. Curtis Award will be announced later.

April 1 is the closing date for submittal of entries in the Charles A. Coffin, George A. Hughes, Augustus D. Curtis and Thomas A. Martin Awards. March 1 was the closing date for entries in the Forbes, McGraw and Marshall contests. Judging of the papers will take place this spring and announcements of the winners will be made in June at the Convention in Atlantic City.

The Electric Utility Paradox

By C. W. Kellogg
President, Edison Electric Institute

Presented before the National Industrial Conference Board, Feb. 29, 1940

IT is most desirable to restate the electric utility paradox, which, if not understood, can easily lead to erroneous conclusions. The paradox is this: On the one hand, as the figures recently compiled by the National Industrial Conference Board show, the amount spent for electricity in the average home was only 1.1 per cent of the 71 billion dollars spent by all consumers in 1937. It was even smaller than the amount spent for electrical equipment in the homes. The cost of power in industry averages but 1½ per cent of the total cost of manufacture. This explains why cost of power is not a determinative factor in locating industries and also why industry generally is not located in the areas of cheapest power. On this basis you might naturally ask: Why does Dr. Jordan* arrange for a special talk on a little detail, which is half as large as the amount spent for smokes, one-fifth as large as the amount spent for liquor, one-tenth as large as the clothing item and less than a twentieth the amount spent for food? The answer to this natural question brings out the other side of the paradox, which is as follows:

The great emphasis on the consumption of electricity in the home is largely politics, because the number of users in the home is about 24,450,000 and to the ordinary politician that sounds like 24,450,000 votes, which is a whole lot in any country. The total earnings of the electric utilities are about three times as much as from the domestic customers alone and the amount of fixed capital required per dollar of annual gross earnings is about eight times as large for electric utilities as for general industry as a whole. Multiplying these two figures together means that, as an investment of the people's money, the electric utility industry looms 24 times as great as it does if reckoned merely on the basis of what the people spend for electricity in their homes.

The paradox is therefore that, while the cost of electricity in the home is but a drop in the bucket compared to the total of consumer expenditures, yet the industry that furnishes that service represents one of the greatest aggregates of invested capital of any group in the country—second only to agriculture and the railroads.

Strangely enough the attacks on the utility industry under the New Deal have been directed not at the size of their investment but at the amount they charge the people for electric service in the home! The attack seems even more strange in view of the fact that it is precisely in the field of household electric rates that the utilities have made the most progress in the last decade.

The figure representing investment required to produce a dollar of gross earnings is a stubborn brute. It has remained practically unchanged at about six to one from the earliest days of the industry, and, with the complications of modern transmission and distribution, it tends if anything rather up than down. With respect to this factor, the government is confronted by the economics of the situation the same as the private enterpriser.

In the matter of household rates however the utilities themselves (*not* the government) discovered a number of years ago, long before the New Deal was even dreamed of, that there was something they could do about them, and that was to establish inducement rates (which would drop sharply with increased consumption) and then work vigorously to attain such increased consumption. This the utilities have done assiduously for many years and are continuing to do at the present time—spending about $75,000,000 per annum in sales and promotion effort.

The results they have accomplished can be briefly and graphically told by a few figures. Electric rates have been brought down continuously ever since the industry started operating in the eighties of the last century but the installation of promotional or inducement rates began about 1928, say five years before the New Deal. In the eleven years from 1928 to 1939 the average annual consumption of electricity in the home was increased from 460 to 900 kwhr, almost exactly doubled, and the average residence rate was reduced from 6.60 cents to 4.07 cents—a reduction of 2.53 cents in the period, a reduction equal to over 62 per cent of the present average rate. The national averages do not of course show what has been accomplished in specific areas. Many communities today show average residential consumption of over 2,000 kwhr per year.

In saying what I have about the effect of inducement rates in increasing the use of electricity in the home, I do not want to give the impression that rates have been the predominant factor. For without the invention of current consuming devices, like refrigerators, washing machines, ranges and others, and their constant reduction in cost and improvement in efficiency, there would have been no occasion for the greatly increased use of energy that has occurred. This equipment development has been principally the work of the electrical manufacturers, but the two developments, in rates and equipment, have operated hand in hand to electrify the American home.

A fair and unprejudiced visitor from some distant land, hearing of this accomplishment I have so briefly stated, and learning further that it had been achieved in the face of a 20 per cent increase in hourly wage rates and a 60 per cent increase in the per cent of gross revenue paid out in taxes and a 35 per cent increase in the per cent of gross appropriated for retirements, would, I think, conclude that the utilities had done right well by their 24,500,000 home consumers. But not so the government, not the body supposedly organized by the people to help them in the common efforts of all to make a living.

So the government brought out the "yardstick," referred to by some of its proponents as a "birch rod." In order to appraise the government yardstick it is necessary to consider very briefly the source and nature of the costs which enter into furnishing a supply of electricity.

* Dr. Virgil Jordan, president, National Industrial Conference Board.

As I pointed out in the second point of the utility paradox, it is a business requiring eight times as much fixed capital per unit of sales as the average industry. From this it follows that 5/8 of the cost of furnishing electricity retail consists of fixed charges, by way of interest or dividends on capital, taxes and depreciation. In the case of purely hydro-electric properties, selling wholesale, these fixed charges comprise over 90 per cent of the cost of producing energy.

The government pays no more for labor and materials than privately operated companies but, with the blighting effect of politics on any organization, governmental projects cannot operate as efficiently as a privately managed concern. However, if they want to resort to such a subterfuge (and they have done so in the case of TVA, the Bonneville Project and others allegedly used as yardsticks), they can use the public monies to build them and then "allocate," as they call it, only a fraction of the cost to power. They also pay negligible taxes or none at all, and thus, by purely bookkeeping methods, forcing down fixed charges, they arrive at rates which they call "yardsticks." The government projects cannot, by their very nature, be a measure of what private companies, which have to bear *all* these construction costs, must charge but are rather a measure (yardstick if you will) of the extent of government subsidies. It would be far enough from the comparative facts if only the allocated investment were taken as a measuring stick but in addition, in the case of TVA which claims now to be on a paying basis, interest is not paid because the Treasury pays it. With these interest charges assumed by TVA (as they would have to be by a private company) the claim that TVA is now "on a paying basis" would not be true.

For, mark you, the fact that the Government, in the projects I have mentioned, does not charge itself with the whole investment — or with all the charges on the written down investment —does not mean that the costs are not there. They are there, but are covered up by the general cost of government thus being a deception of the people as to the true cost of government-produced power. The utilities would not object to the subsidization of electric power by government except for two important points: 1st, that the rates thus deceptively arrived at are proclaimed by government as being a fair measure of what the utility companies should charge; and 2nd, that these rates are used competitively by the government against its citizens who in their own operations have to bear all their costs in full.

I recall reading last year George Washington's diary. After his inauguration as President one of his first moves was to make what was then a long journey by stage coach through New England to see how industry was progressing, and to encourage it. He records how at one factory he bought some cloth and brought it back to New York to have it made into a suit of clothes for himself. How far we have traveled from those days of a friendly, helpful attitude of government toward its citizens' businesses to the New Deal where the government is using its power and the peoples' money to attack vindictively one of the people's greatest industries, in which many millions of its citizens have about twelve billion dollars invested!

One of the most notable examples of vindictive attack is in the so-called Death Sentence in the Public Utility Act of 1935, about which we have heard so much since it was passed. Now, no one agrees more fully than I do that the operation of large aggregations of capital for public use must be regulated in the public interest to protect people against abuses. The Holding Company Act with the greatest rigor prohibits all sorts of malpractice and sets up the most meticulous regulation of utility holding companies. Recent events have shown that such regulation has reached the point of strangulation. I deplore this but believe it will right itself with the passage of time.

Not satisfied with this strict and comprehensive regulation however, the framers of the bill added the Death Sentence, providing for the dismemberment of groups of properties, honestly acquired under the law. The basis for dismemberment is not as a penalty for indulging in any of the practices the Act forbids, but solely for not happening to have properties located in the same part of the country. When did it become a crime for a citizen of the United States to own property wherever he pleased in our great Republic? Not only is the death sentence inherently unfair, not only has it nothing to do with regulation, but it is not even logically connected with the regulation in the Act itself. Under Section Eleven of the Act, one company, which might have been guilty of many of the things the Act prohibits, could get by unscathed by the dissolution provision if its properties happened to be close together, while another which had been entirely innocent of any infraction of the regulations in the Act, could, under that section, be dismembered, to the great loss of honest and conscientious investors. Furthermore, the concept of "integration" itself rests only on somebody's idea that a compact enterprise is more economical than a widely diversified one. It is still to be proved that integration will add one cent to net income or reduce rates at all.

Someone might well ask why should the members of the Conference Board bother about this matter of the government attack on the utilities? They all have troubles of their own; why worry about a business which after all is one of the most stable through good times and bad? There are at least two answers to these queries. In the first place, if this principle of government attack on the business of its citizens once gets settled into a governmental policy, there is no telling where it will end. Its progress would seem to depend solely upon the caprice or hunch or prejudice of the bureaucrat who happened to be in power at any particular time. This is not an encouraging prospect for industry in general.

In the second place (and probably a more practical answer), the public interest in its electric utilities is in getting at all times the best and most dependable service. It is a highly technical business and its amazing progress has been due to the competitive pressure of the electric industry to get its share of the consumer's dollar. This pressure had produced all the engineering effort toward constantly higher efficiency and dependability and the sales effort toward constantly greater use. Having in view the Post Office, with its relative stagnation in ideas and methods, what sort of electric service as to efficiency and dependability do you think complete control of the electric supply by Government would mean for the people? Is it not at least interesting to note that intercity postal rates have gone up 50 per cent in recent years, with continued heavy deficit in the Post Office Department, while household electric rates in a dozen years have been cut by 60 per cent to their present level?

And speaking of rates, one of the most graphic comparisons was made a few years ago by our colleague Gerard Swope after his European trip. He worked out the comparative number of minutes or hours of labor, at the respective rates,

which it took to acquire various standard articles in this country and in European countries. He found that it took 3.6 minutes of labor to buy a kilowatthour of electricity in the United States. In the eight European countries which he studied it took an average of 24 minutes' labor (or 6 2/3 times as much as in this country) to buy a kilowatthour and in the highest of the eight countries it took 43 minutes, or about 12 times as much as in this country. Our present average residence rate is only 82 per cent as much as it was when Mr. Swope's study was made.

It is interesting to observe that every time the Federal Government has planned an attack on any of the enterprises of its citizens, it is prefaced by a barrage of criticism purporting to show the industry in question in a bad light. Before the TVA and other similar subsidized wastes of public money could be undertaken it was necessary to make people believe they were being gouged. Before the Rural Electrification scheme was put forth, and almost ever since, the government has put out statements to the effect that the utilities were actually trying to keep the farmers from getting electricity. The exact reverse had been and still is the case; namely, that the utilities, in their eagerness to electrify the whole country as rapidly as possible, had gone much further afield than the density of farm population would justify economically and were in effect forcing a subsidy from the city dweller to help the farmer get electric service and get it cheaply. The cooperatives the government fostered through the Rural Electrification Administration do not publish complete figures, but those which have come out indicate a general failure to earn costs, a failure which is inevitable with the thin territory served.

Just what the original event was that produced such vindictive attack on a whole industry—that would injure millions of innocent investors in order to hurt a few persons, I do not know. It does show the great importance to the utilities of keeping their contacts with their customers friendly and without friction to the maximum possible extent. This all well managed utilities have realized clearly for decades and the special efforts along the lines of customer relations of the last ten years have, I believe, caused the average man on the street to be relatively indifferent to the general utilities question at the present time.

One thing about the general utilities situation that has been gradually developing is a relative maturity. I do not refer to any tendency to saturation, for that I do not believe is yet in sight. I refer rather to the changes in percentages from year to year that come with greater size. I can illustrate my point by a few simple figures. The output of electricity by a fairly smooth trend line. The slope the law of least squares, be represented by a fairly smooth trend line. The slope of that line during the so-called boom period from 1922 to 1929 was almost the same as today. Yet the same annual increment growth as was shown in 1922, which represented 11 per cent in that earlier year, represents but 4.3 per cent today. Similarly, the $600,000,000 increase in electric utility plant investment which has been estimated for 1940 represents a gain of but 5 per cent while the approximately equal average actual increase of 1922 and 1923 represented a gain in those years of about 15 per cent.

Assuming that one half of the money for these extensions could safely be raised by the sale of bonds, the respective amounts that would have to be raised by the sale of stocks would obviously be 2½ per cent and 7½ per cent respectively in the two years considered. The smaller figure is one that could almost be defrayed, but not quite, by current retirement appropriations and other accruals and possibly some withholding of net earnings, but the larger one of 20 years ago would definitely require substantial equity financing.

What this means in utility financing, assuming the continuation of this trend I have mentioned, is that while equity coverage for bonds is just as essential as it ever was, its accomplishment is no longer of such crushing and imperative magnitude as it was two decades ago. This, combined with the reduced construction requirements, incident to the depression, explains why, with no substantial equity financing having been done by the utilities in nearly a decade (while over three billions was spent on the properties) the utilities were able to maintain, and in fact somewhat improve during the decade, that conservatively low ratio of debt to total property which, even today, in spite of all Government attacks, makes the first mortgage bonds of sound operating electric utilities among the highest class investments on the market.

I bring this out not to palliate the attacks by Government on the utility industry but merely to show that, short of regular Mexican confiscation, the utilities, from their very size and maturity, are less vulnerable through the financing route than they were twenty years ago. This should I think be most reassuring to the Life Insurance Companies even though only moderately so to stockholders in view of the negligible return that has been shown on the additional utility investment of the last decade (about 2.3 per cent on $4 billion, decade ending 1937).

We in the utility industry desire earnestly to cooperate to the fullest extent with the Government in the general electric power program. Whatever we may think of the right of Government, if it so decides, to go into the business of producing electricity, the fact remains that the Federal Government is in the business in a big way in various parts of the country. We realize that this power must be sold to those who can use it, regardless of how or by whom produced, and, as our industry has developed the market for electricity through the years to 28,750,000 customers, we naturally feel that it can be most efficiently distributed through the channels we have already provided. We go further and say that if, by Government subsidy of taxpayers' money, the Government can sell this power for less than we, who have to bear all our own costs, could produce it, we will buy it and pass on to the consumer all the resulting saving. But does this satisfy the Government? Not at all. Its agencies say, in effect, "You must charge for it retail the rates we tell you to, based on a yardstick which does not include the costs you have to pay."

This might seem arbitrary enough, but the Government goes further still. It sends its emissaries out through our market and incites the people to discontent with the existing situation and distrust of their existing public utilities, urging them to go in for the wasteful duplication of municipal ownership and operation. I know of one recent case where these emissaries tried to get local preferred stockholders to sell out, with the threat that their stock was to be rendered valueless by Government competition.

This picture of persistent and vindictive attack, from the agency of the people presumably set up to help and forward the business of its citizens, is not a pretty one but it is accurate. The power and prestige of the Federal Government are so great that the attack is a most difficult one to fend off. The utilities

have nothing to sell but service; they feel that with constantly mounting costs they have done an excellent job in continually reducing rates year after year while at the same time improving and extending their service. They feel that their only defense against Government attack is to continue their efforts at efficiency and economy, firm in the belief that in the end the public will understand the facts and will agree that the people's electric requirements should be delivered to them and paid for on a factual basis and in an atmosphere devoid of hate or malice.

Things are bad now but what we need is patience and courage. The utilities have both. Like any large technical business they have had great difficulties to overcome in their growth to maturity. These have been surmounted one by one and I have no doubt the present dark clouds will be dissipated in time. Probably our difficulties are merely one more symptom of the trying time our whole country is going through and, like the country, we only hope that relief will come before the damage is past repair. With the tremendous resiliency which has always been one of the industry's outstanding characteristics, I am, in spite of the dark picture I have painted in my talk, still quite hopeful for the future.

It is well to remember that although the first municipal plant was established in 1881 and that, partly due to the difficulty of private electric systems in raising capital in the early days, the number of municipal plants later grew to several thousand, yet in a relatively short time more than half of these sold out to private ownership and at the end of fifty years of experience in this country over 95 per cent of the power produced for public use in America was produced by privately owned electric utilities and over 90 per cent of the customers were served by them. The municipal utilities were tax exempt and enjoyed other subsidies, but this was not a sufficient advantage to offset the inherent superiority of private initiative. Today, after seven years of lavish Federal subsidy, the private utilities are still producing 90 per cent of the power generated in the United States for public use and they serve 88 per cent of the customers.

The center and soul of the electric utility industry is the hundreds of thousands of men and women who are engaged in its manufacture, distribution and sale. Their energies are devoted heart and soul to the efficiency and dependability of the essential service they render to their fellow citizens. They have been dazed from time to time at the Government attacks on a business to which they are unselfishly devoting their best energies, even at times to the risk of life itself, but they have never given up or quit in their great task. Even during the dark years since 1932 they have added 4,872,000 customers to their lines; they have seen the energy output grow from 80 to 128 billion kilowatt-hours per year, a 60 per cent gain; they have seen $2,430,000,000 spent for extension to their properties, and they have received a gain of 34 per cent in their hourly pay. They can look at the market reports and see their bonds selling today at an all-time high; they know that their companies are spending $75,000,000 a year for new business expense to increase the use of electricity—and for all these reasons they are going forward with high courage. I believe the public should and will follow their good example and that their efforts in the public service will not be in vain.

Nature Stages Magnificent Stunt for Public Utilities

By Merryle Rukeyser

DAME NATURE early this week staged a magnificent unscheduled publicity stunt in behalf of the public utilities.

In the environs of New York a sleet and ice storm not only damaged trees, but also wrought wholesale havoc to overhead telephone, electric light and power lines.

Accordingly, the dear old public in the affected areas temporarily stepped back across the pages of history to primitive times. Incoming and outgoing telephone calls ceased. And the sense of isolation became more acute as the broken lines, designed to bring in electric current, kept the radios silent. As the current ceased to flow, the oil burner, which leaned on electric current, went cold.

* * *

PRESTO! The typical family in Westchester county, and in sections of Long Island was thrown back to the primitive conditions of Thoreau's Walden. Ralph Borsodi's inverted dreams about "this ugly civilization" suddenly came true, and families weren't "annoyed" with the services of the public utilities. The washing machines, the electric ironers, and all the household gadgets temporarily went on strike. I for one didn't think that the interruption represented progress.

But my hat goes off to the utility companies. They immediately began to meet the onslaught from nature with all the available manpower in nearby regions.

In the limited area affected, the problem was more acute than in the New England hurricane, for in the earlier catastrophe the problem was largely correcting disrupted main cables. This time the trouble was scattered in the individual lines of many hundreds of subscribers, and the detail was terrific.

* * *

THE temporary lapse in these modern symbols of science and invention will help to add to their appreciation. In this recent age of emotionalism and demagogy, many are inclined to look a gift horse in the mouth, and grumble about details instead of recognizing the magnificent contribution which electricity makes toward better living.

Some folks have to be jarred into a recognition of values through their temporary loss. This has occurred in numerous communities which irrationally damned the railroads until conditions got so bad that the company decided to tear up the local tracks. Then suddenly the people awoke to an appreciation of the economic and social benefits of railroad service.

* * *

MAKE no mistake about my position. I advocate honest financing, efficient management, and the lowest rates consistent with technological progress in the utility field. But, irrespective of this, the electrical servants at our beck and call—the telephone, the radio, the automatic heating furnace, and electrical appliances in the kitchen are the cheapest servants we can employ. I string along with the late Samuel Vauclain, one-time president of the Baldwin Locomotive works, who told me years ago when telephone service was inaugurated in Cuba, that he had sold a bill over the phone instead of making a trip to Cuba, and that the toll for the call didn't begin to represent the value of it to him and his company.

In the Minneapolis Morning Tribune, March 8, and other newspapers

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Mr. Davidson Goes to the Movie at Port Huron

Impressions of the Film "Young Tom Edison"

By James E. Davidson
President, Nebraska Power Company

A photograph of Edison made shortly before 1860.

From a letter to Mr. Davidson from the editor.

We want to run in the next issue of the BULLETIN a good story on the new Edison film, provided the picture merits it. I need not point out that if Metro-Goldwyn-Mayer has done an adequate job, this picture and the one to follow, Edison the Man, will be not only of deep interest to the electric industry, but will reflect credit on it in the eyes of the millions of people that will see the film.

I know that you had a prominent part in the premiere at Port Huron, and I know of no one whose judgment of the picture I would place before yours. If you feel the picture warrants the endorsement to the electric industry that will be implied in an article in the BULLETIN, will you do the article for us? As one who began his work for the industry at Port Huron, and as a life-long admirer of Mr. Edison you are a natural for the job.

I think such an article might, in a general sense be a review of the film, but it will be a hundred times more interesting if it is written to show how it appealed, with all its personal connotations, to Jim Davidson, an old Port Huron boy.

Mickey Rooney in the character part of the film.

"YOUNG TOM EDISON," which I had the pleasure of witnessing in its premiere showing, on February 10th last, at Port Huron, Michigan, my old home town, is exceptionally good entertainment and a very fitting introduction to its coming sequel, "Edison the Man."

To me, of course, the motion picture story of Mr. Edison's boyhood holds special interest and significance, for although I wasn't born long enough ago to be a member of Port Huron's "I Knew Edison" club, I do belong among those Port Huronites who from early childhood have heard innumerable tales and anecdotes about Tom Edison's boyhood there. In addition to this personal element, which might well tinge and heighten my interest, "Young Tom Edison" appeals to me as a very able interpretation of a fine and unique character. It is a fitting tribute to the inherent and budding genius of the man who was later to bestow immeasurable benefits on the world.

No review of the picture would be complete without paying tribute to those who had a part in its production—to

The famous "Edison Train" of 1850 vintage. It contains the historic baggage car that young Edison nearly burned up while making an experiment. This train now on display by Henry Ford at Greenfield Village, Dearborn, Mich., ran from Detroit to Port Huron for the premiere of the film.

Mickey Rooney as young Tom, Eugene Pallette (above) as the testy railroad conductor of Tom's news butcher period and Virginia Weidler (below) as Tannie, Tom's sister.

Incidents in the great man's boyhood — from the film "Young Tom Edison."

Louis B. Mayer and John Considine, Jr., of Metro-Goldwyn-Mayer, its producers; to Norman Taurog for his able direction; and to Mickey Rooney, sensational young dramatic star, and his supporting cast, including Virginia Weidler, Fay Bainter, George Bancroft and Eugene Pallette, who so skillfully portray the principal characters.

Every scene in this rapidly moving story helps to build the unusual character of the boy who is to develop into the genius, Thomas Alva Edison, Wizard of Menlo Park. Judged by normal standards, the verdict of his father and fellow townsmen that "Young Tom" was addled because of his inherent curiosity and insatiable thirst for experiments, is true to life. In the same circumstances, this would be the attitude toward misunderstood genius even in our more modern times, despite any advancements we might claim for psycho-analysis since those pre-Civil War days of Edison's youth.

I also commend this picture for the authenticity of its historical settings and backgrounds. Reconstruction of the scenes in Port Huron, the streets, manner of dress, mode of living and social life of the small Michigan city are realistically reproduced. This adds to its historic as well as entertainment value.

Henry Ford, intimate friend of Mr. Edison, and Mr. Ford's priceless collection of Edison memorabilia, in his Edison Institute, at Dearborn, Michigan, were of invaluable assistance in reconstructing authentic, historically accurate settings for the picture. One such example is the old Grand Trunk train on which Mr. Edison was news butcher, carried on his chemical experiments, and published a newspaper for sale to passengers riding between Port Huron and Detroit, in the sixties.

A section of the Edison historical procession passing one of the three Port Huron theatres on the day of the "Young Tom Edison" premiere.

Mr. Davidson

Incidentally, the journey of the motion picture stars and other guests from Detroit to Port Huron, for the premiere celebration, was made on that train. That 60-mile ride served to give many of these passengers, myself included, the feeling of being transported back to those historic days with which the Edison picture deals.

I question the wisdom of reviewing in detail the plot of the story of "Young Tom Edison," lest pre-telling spoil its interest before you see it on the screen. I heartily recommend that everyone associated with the electrical industry, and their families, should see the picture, both for its educational value and for good entertainment. The play as a whole achieves its purpose of presenting a credible interpretation of the boy Edison as he was known to neighbors and friends in Port Huron.

Having seen "Young Tom Edison," I await with deeper interest its sequel, "Edison the Man," which will be a "must" date on my calendar as soon as it is released. I feel that the first picture helped me to understand better and appreciate more the genius and driving force of the man of strong character who, by countless experiments and unrelenting perseverance, contributed so much of lasting good to the electrical industry and to people throughout the world. I am confident that with Spencer Tracy in the rôle of Mr. Edison, the coming picture will be a five-star production, if not indeed a classic in the annals of the motion picture industry. I base this opinion on the superb work Mr. Tracy did in interpreting the character of my great and good personal friend, the Rt. Rev. Msgr. Ed. Flanagan in the screen drama "Boys Town."

Mrs. Louis B. Mayer, Mickey Rooney, star of "Young Tom Edison," Francis Jehl, associate of Mr. Edison in his early days, and Louis B. Mayer, head of M-G-M Studios at reproduction of Menlo Park Laboratory in Greenfield Village.

Advances in the Use of Electricity

By Frederick W. Doolittle

A paper originally prepared for the British American Engineering Congress—Reprinted from Civil Engineering, February, 1940

IN dealing with advances in the use of electricity, one might confine himself to a catalog of the quantities used now and in years past for various purposes and processes. With equal pertinence one might recite the development in the number and purpose of the devices through which, in the form of light, heat, or power, electric current has been made increasingly useful to the consumer. A survey of the technical field would likewise be pertinent and of interest. Recent developments in the use of electricity in illumination, in heat applications, in communications, including television, and in the great number of mechanical devices ministering to our comfort and convenience, as well as to economy in production, provide an almost limitless field. But here I would like to handle the subject from a somewhat less technical viewpoint.

Use of electricity, measured as kilowatthours per capita, is high in the United States. It is high both as compared with use in many other countries and with use in this country in past years. In 1938 the output was about 1100 kwhr per capita, of which 80 per cent was generated in central stations. Central-station output in 1929 was nearly 50 times what it was in 1900. From 1929 to 1938, a nine-year period of depression and stagnation, central-station output continued to increase but at a lesser rate and irregularly, domestic use growing by nearly 90 per cent while all other uses, largely industrial and commercial, increased less than 15 per cent.

The factories of the United States provide about 5 hp. of mechanical energy per worker, or perhaps twice that available in the factories of five other principal industrial countries where the range is between 3 and 2 hp. per worker. Kilowatthours used in industry contribute to the production of wealth in the form of capital and consumer goods; these in turn fix our standard of living, so that the social implications of the use of electricity are not to be found in domestic consumption alone. It is then of interest to compare the growth in domestic use, that is, the use of the ultimate consumer, with other uses where electricity enters into commerce.

Comparisons of Different Types of Use

Classifications of use prior to 1926 are not satisfactory for comparisons with later years, and since that date even the best estimates, those of the Edison Electric Institute, need some interpretation. For example, during the 12 years from 1926 to 1938 about 1,100,000 farm customers were added to central-station lines with an increase of use by all farm customers from 700 million to 2500 million kwhr per year. However, the significance of this will be clearer if farm uses east and west of the 100th meridian are set out separately. This somewhat arbitrary geographical division separates the territory on the east, where there is little or no irrigation, from that on the west, where agricultural pumping is or may be involved and where use of electricity on farms is to a considerable extent industrial. Comparing the two situations, it appears that from 1926 to 1938, farm use in the East increased 10 times while that in the West increased 2½ times, the use per customer meanwhile declining 25 per cent in the West and increasing nearly 80 per cent in the East. Among the many factors contributing to this disparity it should be noted that the primarily industrial use on the western farm is between 4 and 5 times as great as the primarily comfort or convenience use on the eastern farm.

EDISON ELECTRIC INSTITUTE reports kilowatthours sold under these headings: farms, residential, small commercial, large commercial, street lighting, street railways, electrified railroads, municipal, and miscellaneous. Combining the farm and residential classes, we have the principal comfort and convenience use, though it does contain some commercial use. Similarly, the combined large and small commercial classes are the best measure of commercial and industrial use. Neglecting the other classes, which together amount to from 10 to 12 per cent of the total, progress in these two main categories during the past 12 years is compared in Table I.

TABLE I. PROGRESS IN COMFORT AND CONVENIENCE USE COMPARED WITH THAT IN COMMERCIAL USE DURING PAST 12 YEARS

(In millions of kilowatt hours)

Year	Residential, Including Farm		Large and Small Commercial	
	Kwhr	%	Kwhr	%
1926	7,450	100	41,477	100
1927	8,399	112	45,306	109
1928	9,807	131	49,407	119
1929	11,128	149	56,077	135
1930	12,491	167	54,091	130
1931	13,252	178	50,481	121
1932	13,073	175	43,070	104
1933	12,992	174	45,446	110
1934	14,090	189	49,221	119
1935	15,188	204	54,453	131
1936	17,130	230	64,267	155
1937	19,264	258	71,104	171
1938	20,989	282	63,216	153

Relatively, domestic use shows much the greater and more uniform advance, while absolutely, commercial use, from 1926 to 1938, increased 1.6 times as much as domestic use. A decline from the previous year occurred twice in the case of domestic use, four times for commercial; and measured in terms of use at the beginning of the period the commercial declines were six times as severe. Commercial use first fell off in 1930, but it was not until 1932 that domestic use first showed the effect of business conditions. In 1933 commercial use again began to rise, followed in 1934 by an increase in domestic. Again in 1938 there was a sharp decline in commercial use while domestic increased. Apparently 1939 ran ahead of 1938 in both groups. Salesmanship, industrial activity, customers' earning power, progress of invention, substitution of electric for competitive services, type and level of rates, rainfall in irrigation areas, all these and many other factors contribute to advance in use of electricity, and if this advance is to reach its fullest measure we must learn much more than we know now about the relation between promotional forces and acceleration of use.

The differences in the advances cited

are a challenge to the statistical analyst. They are accounted for to some extent, I suppose, by the delayed effects of the dislocations of war and the hardly less serious dislocations accomplished by those trying to repair the dislocations of war by trial and error, where no formula of mathematical exactness exists. In this field there has been no Bernoulli, no Newcomen, no Francis. It is perhaps too much to hope, in view of the painful lack of progress in the past, that somewhere there is a Faraday to be followed by a Maxwell, producing a formula dealing with the dynamics of peoples and races, whose work in turn a Hertz and a Marconi of a later generation may understand and apply. From Clerk Maxwell's equations to world-wide broadcasting, science took no backward steps though at first the pace was slow and faltering. The electro-magnetic theory of electric waves oriented progress. Unhappily for our social and economic progress, personal magnetism and waves of emotion do not appear to be similarly controllable or predictable phenomena, nor are they likely to be expressed in the language of mathematical physics. Nevertheless we hope that future years will see a return to advances in commerce, measurably free from the hazards of political upheaval, recalling the past when enterprise faced its problems with a confidence not yet shattered by wars and rumors of wars—by ever-changing philosophies of social welfare and political advancement—by the creed that whatever is, is wrong. Full advance in the use of electricity and in the creation of wealth of every sort awaits a regained confidence.

The end of advance in the use of electricity is saturation, but saturation is not a simple concept. There are at least three factors whose functional operations contribute to the result. First, there is saturation of territory, measured by the degree to which an area is covered by service lines. Complete saturation will exist only when distribution systems so cover the territory that no one, city or rural dweller, is beyond the reach of electric service. In 1902, 20 per cent of the communities of 2500 people and over and 80 per cent of those under 2500 did not have electric service available. Today practically all these communities have service available, and in addition service is available to 50 per cent of the farm homes.

A second factor is measured by the percentages of total families and industries within reach of existing lines that are taking service. The problem of unwired houses within served territory has practically disappeared in our urban communities. It is progressively disappearing in rural territory. Practically all industries are connected to service lines. Many, it is true, particularly those needing steam for process purposes, still maintain their own power plants, but their number is diminishing.

TABLE II. ALLOCATION OF DOMESTIC ENERGY SALES TO VARIOUS USES, IN PER CENT (EDISON ELECTRIC INSTITUTE)

	1938	1926
Refrigeration	22	2
Radio	10	1
Range	10	13
Water heater	7	4
Other appliances	17	15
Light and miscellaneous	34	65
	100	100

The third factor in saturation is that of the current-using device. The limitations here are as yet unknown. The electric range, radio, refrigeration, and now air conditioning, with a myriad of small devices, have been added to illumination in the domestic field, and the end is not yet. Commercial application in lighting and air conditioning are steadily advancing and industrial use adds electrolytic processes to light, heat, and power.

Saturation measured in terms of territory covered is nearing, except in regions of such sparse settlement that central-station service is not economic; in terms of the percentage of actual to potential customers, future growth is measurably limited to growth in population and in industries, but in the multiplication of uses, domestic, commercial, and manufacturing, invention so far has outrun our imagination and the limitations are not known. There are, however, in this field two limitations that we can by no means disregard: the cost to the customer, including the equipment through which electric current is used, and the physical limitations imposed by modern urban housing. Small apartments are economical of light, heat, and power, a condition in part offset by the substitution of convenience devices for domestic servants.

During the period 1926 to 1938, kilowatthour sales of domestic energy increased about three times, with some interesting changes in the relative use for different purposes. From estimates of the EDISON ELECTRIC INSTITUTE, it appears that in 1926 radio absorbed about 1 per cent, and in 1938 10 per cent of the total domestic kilowatthours. In the same period refrigeration advanced from 2 to 22 per cent of the total of domestic use. In the meantime lighting declined in relative position from 65 to 34 per cent, while in the aggregate this use increased by 2 billion kwhr. The range, while increasing its use of kilowatthours by a billion, nevertheless declined from third place in relative importance to a tie with radio for fourth and fifth places (Table II).

Without going into the voluminous details involved in such a computation, it is of interest to note that the capital investment of a modest household, prerequisite to its taking full advantage of electric service, will run to about $750. This will provide range, refrigerator, radio, washing machine, vacuum cleaner, and flat-iron, together with house wiring and a reasonable amount of lighting. The supplier of electric current must also make a capital investment of as much or more. The customer, though he may not realize it, carries a capital charge of some $90 per year on his own investment in addition to the cost of current, which for the equipment noted, will average, say, $70 per year. As an interesting study I suggest two comparisons: (1) the first cost and annual operating expense of various devices, and (2) the cost per kilowatthour of the machinery of production as compared with that of the devices of consumption.

One of the most interesting advances in the use of electricity has been in illumination. Probably the best statistics on this subject have been privately prepared and distributed but have not yet been published. The figures relate to all illumination, not domestic alone, and show a cost to the user per million lumen hours of $71 in 1900 and $3 in 1934, with an increase in lumen hours per capita in the lamps sold from 8 in 1900 to 2200 in 1934. From 1890 to the present there has been an almost continuous reduction in cost per lumen hour, occurring under three headings—decreased cost of the lamp in terms of its life, its increased efficiency, and the decreased cost of current. From 1890 to 1934 the cost of the average incandescent lamp decreased about 60 per cent, its life increased about 30 per cent, and its efficiency nearly 500 per cent. In the meantime, the cost of current has decreased to about one-fifth of its original price. These factors are not independent variables in our cost equation, but a general picture of their effect may be given as follows:

Had the only change in 44 years been in the price of the lamp, the cost of illumination would have declined 5 per cent. Had the only change been in lamp efficiency, it would have declined 80 per cent. Had the only change been in the lamp cost and its efficiency, there would have been a decline of about 82 per cent. But in the meantime the cost of current declined nearly 80 per cent, and the combined effect is to decrease the cost in cents per thousand lumen hours from 7 to 0.3, or by 96 per cent.

Here, it seems to me, we have an exemplification of the interplay of economic factors in a free economy which is of significance. Economies have resulted from increased volume in production of lamps, from increased volume in production of kilowatthours, from invention and improvement in processes, and from the continuous, earnest, and effective study of engineers. Neglecting for a moment the fact that the increase in use of current for other than lighting has contributed in dominant degree to the decrease in cost of producing current, and that the development of manufacturing in various lines has contributed to reducing the cost of electric lamps, there is still this phase of the process of cost reduction that warrants thought. The manufacturer might have held the price of the lamp fixed and increased either its efficiency or its life in a greater degree, or the efficiency and life might have been held constant and the price reduced still further. As a practical solution some of the economy of mass manufacture has appeared in each of the three factors—first cost, life, and efficiency. Similarly the economies in increased production of electric current might all have been reflected in lower rates for industrial use or all applied to domestic service, or the economies might have been reflected in subsidizing the manufacture of current-using equipment. In fact, this has been experimented with from time to time through the supplying of free lamps to domestic service customers.

The student of these problems, realizing that there is no single generally accepted theory of determination of costs in the production of electric energy, may be puzzled to know whether the economies achieved have been correctly shared. The load factor, or more accurately the comparative demand curves, of the several types of users of an unstorable product are important factors, yet so far there has been no general acceptance of the theories of Hopkinson, Greene, Wright, and others concerning direct and common costs; and even if one could determine the precise cost of serving each individual customer or each class of customer, rates rigidly related to cost are by no means necessarily in the interest of each group. Clearly alternative sources of supply as well as competitors' costs fix a ceiling above industrial rates. Other classes cannot afford to have this business loss to the supplier, for its magnitude and characteristics contribute greatly to lowered production costs. We ought not to give any one class of customers an advantage at the expense of other classes, attractive as such strategy may appear, but the facts are not easily determined. A sound objective is to reach such a distribution of costs among the different groups as will result in the maximum possible addition to the wealth of the community. This can result only when the unit costs of production both of the electrical energy itself and of the articles of commerce into which it goes, are at a minimum.

In industry there is a phenomenon with which we are all familiar. Industry seeks to establish itself where fixed costs and operating expenses are low, raw materials conveniently at hand, and markets readily available. Obviously it can but rarely find a location that gives it each of these advantages. Assuming that it elects cheap land, low taxes, and convenience to raw materials, it will then presently be heard to ask for a subsidy from railroads to put it on an equality with its competitors as regards freight rates to markets. Other competitors, electing to locate near their markets, will then be heard to ask for subsidies from the railroads for the assembling of raw material; that is, the enterpriser desires to obtain as many natural advantages as possible without assuming the burdens entailed thereby.

We have a similar situation where certain users of current for domestic purposes desire to retain the advantages of rural and suburban life and yet pay the same rates per unit as those who live near the centers of production and distribution or who are so equipped as to be served cheaply. With this desire one cannot quarrel; it is natural in all human relations. But there can be no miracles, there can be no white rabbits pulled from silk hats; the community as a whole, whether as other customers or as taxpayers, must carry the costs of service to those customers, the nature of whose use entails costs exceeding their willingness or ability to pay, and perhaps even the value of the service.

Problems Awaiting Solution

It has been possible in this brief discussion merely to suggest a few of the problems affecting advance in the use of electricity. The engineers who practice in this field, either as administrators or technicians, are daily confronted with these and other problems, the number and variety of which bear testimony to the fact that the resolution of political, economic, and social forces is often neither simple nor painless. The adoption by the social scientist of the technique of the engineer, and the acceptance by the engineer of slogans as axioms will not bridge the gap between plan and performance in the complex field of political planning.

In the meantime we do go forward. We have continually improved the technique and cheapened the cost of producing electricity and of delivering it to users; we have assembled the necessary capital and made service widely available; we have perfected devices profoundly affecting the processes of industry and promoting comfort, convenience, and entertainment in the home. These things have been accomplished under competition in the capital and equipment markets and regulated monopoly in the central-station field. More recently suppliers of current have been faced with competition by the federal government and by lesser authorities subsidized by federal funds—both relieved of state regulation, taxation burdens, and the responsibility of uniform accounting. Time alone will permit an accurate public appraisal of the value of these developments to the nation and to the immediate recipients of the gifts. In the meantime I suggest the importance of engineering thought on the following two problems:

1. How can total cost be made a minimum? How can essential equity capital be attracted to the industry of supply on favorable terms, and how can the consumer be equipped with all the devices of consumption he ought to have? What should be done to improve the cost characteristics of different classes of customers, and what can be done to bring about the most favorable balance between costs of generation, transmission, and distribution?

2. What are the costs of serving the various groups of customers? To which groups and in what amount should subsidies be granted? Who should bear the costs of these subsidies?

The solution of these problems will have an important bearing on future advances in the use of electricity. Of one thing we may be sure—the full costs cannot be avoided however skillfully they may be deferred, distributed, and described.

A Suggested Range of Public Relations Activities for a Utility Company

By Henry Obermeyer

Assistant Vice-President, Consolidated Edison Company of New York

From an address before the Advertising Club of New York, March 15.

OUR ideal company will begin by carrying a well-rounded newspaper advertising schedule. Through this medium it will promote the sale of appliances to stimulate the business of cooperating appliance dealers. It will extend the use of existing appliances.

It will try to gain a better appreciation of the value of its services on the part of the public and the community. It will publish information about its business and business problems that is of mutual concern to the company and to the public which it serves.

Every month, when it sends out its bills, it will enclose a leaflet or other form of publication filled with timely items that are read at the psychological time when people are most conscious of their dependence on utility service.

It will reach the ear-minded portion of the population through a weekly radio program which, besides the regular commercials, will dramatize the background and history of its service area and so convey some idea of the intimate relationship between the community and the utility which supplies the energy that keeps it alive. It will use talent from its own employee family, if such can be found, but never less than the best.

It will use every medium of information that is economically or otherwise suited to particular purposes—billboards, direct mail, trade publications, window displays, posters and the like. Its own windows will be colorful and attractive in the spirit of putting its best foot forward at all times. Posters will adorn both sides of its delivery and service trucks and their message will reach into every neighborhood from the most exclusive to the most congested sections of the city. Its properties, situated along the main arteries of traffic, will be suitably identified by attractive signs as will also its business offices and showrooms in convenient locations.

Its plants, generator stations and other points of interest will keep open house and be accessible to visitors at all times, in fact, the company may even arrange guided tours during business hours with trained guides in attendance and with every facility for the comfort and instruction of the public.

Even more important, it will record the history and operations of its business in imperishable film, sparing no effort in making it comparable in technique to the best examples of the motion picture art. Its distribution schedule will cover schools, churches, clubs, fraternal organizations, neighborhood groups—wherever people are gathered together in a receptive frame of mind, which is amazingly often. It will be careful never to force its program, never to appear to solicit an audience. With judicious announcements, word-of-mouth publicity, and the cooperation of employees in their own club affiliations, you can always depend on ever-hungry program committees to do the work of a good booking agency.

Our composite utility will also conduct public speaking contests as well as voluntary education and training among those employees who are interested and qualified for this type of work on their own time. It will encourage them to talk in public about things with which they are directly familiar, but will warn them against going off the deep end, especially in answering questions of policy or other matters outside their experience.

It will give special care to the training of all public contact employees—that is, those who meet customers in the office or in the field—on the theory that every such employee represents the company in the fullest sense of the word. This is, perhaps, the highest form of public relations in action, though all-too-often overlooked by other industries as well as the utilities.

It will take advantage of modern survey methods: by its own trained employees to discover methods of improving its services based on customer suggestions; and by specialized independent agencies to gage the trend of public sentiment as well as the effectiveness of its advertising and informational activities. It will publish and distribute informally written, easy-to-read booklets and pamphlets that will help customers to understand the necessary rules and regulations of its business.

It will give prayerful attention to the format of its forms and form letters to the end that they may be completely informative, helpful and friendly in tone, and above all tactful in the handling of certain delicate but inevitable transactions.

It will take the trouble to welcome new customers and to see that they are properly advised. In responding to calls for service, it will place promptness and courtesy on the same pinnacle as efficiency, which is the highest. And it will try to prevent emergencies as well as to correct them by seeing that the public is made aware of the limitations connected with the use of its services as well as the precautions that need to be observed.

It will take part in, or at least offer its assistance, to every worthwhile civic undertaking that works for the prosperity and well-being of the community; and in the best of them will not hesitate to accept the responsibility of leadership. In attracting people and industries to settle there, the utility will be at once the most effective advertisement and the most enthusiastic advertiser. Its self-interest is so obvious in this regard that it need never fear the public suspicion of self-aggrandizement—which is a paradox, but true nevertheless.

It will be satisfied when people take the utility for granted, for then things are going as they should. But when nature or other forces beyond human control cause interruptions in service on a large scale, it will recognize its opportunity—while promptly restoring the status quo ante—to dramatize the facilities which it maintains at all times to safeguard its sources and distribution

system against predictable contingencies. One company that I know celebrates each year the anniversary of a famous flood, and thus capitalizes on it in this way over and over again.

Industrial or labor relations likewise have their public relations side from the moment when an application for employment is received to the time when the employee is retired on pension or superannuation allowance. Since we may assume that our company has an enlightened labor policy, it will be part of this policy to let the public know the details; for efficient, dependable utility service cannot exist without reasonable care for the well-being of those who supply it. As the company serves all classes, it will jealously guard against any symptom of discrimination on the basis of race, creed, or color in hiring, firing, or advancing its personnel. It will keep its people regularly informed of policy changes and all other matters of interest through a well-edited house organ; and in some instances may even issue to its employees an annual report, as comprehensive and carefully prepared as that which it issues to its stockholders.

And, speaking of stockholders, it will remember that these too are a part of the public, and by no means the least influential part. Therefore, its annual report will be informative, attractive, and easy to scan. Between times, it will take advantage of the mailing of dividend checks to enclose added material of current significance. When agitation simmers in the political pot, it will be able to look to its stockholders as well as its employees as an influence for corrective thinking throughout the community.

Its attitude toward newspapers and newspaper editors will be correct to the point of ramrod uprightness, and completely devoid of any relation to the business department. Its policy will be to serve local publishers by giving their news-gatherers prompt and free access to the sources of news and to assist them so far as possible by preparing statistical and other information in the exact form in which it is required.

The individual responsible for the company's relations with the public will be the responsible head of the company, and no lesser party will do. In this way, and in this way only, will every department feel its individual responsibility for maintaining the company's good reputation. Of course, there is one proviso here, and that is that the boss be a good public relations man, conscious of the importance of this phase of his job, and willing to give it the necessary time.

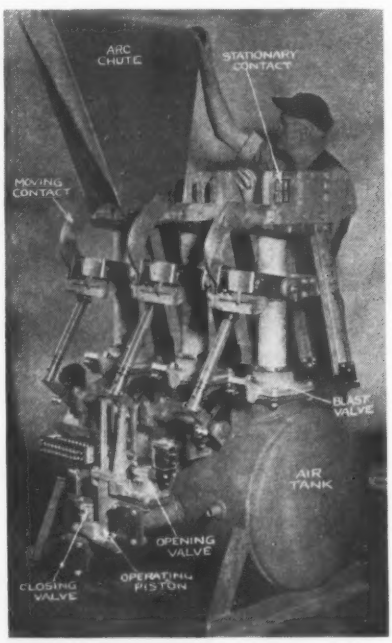
Westinghouse Air Circuit Breaker Demonstration

ON MARCH 5 the Westinghouse Electric and Manufacturing Company presented test demonstrations of the operation of their new compressed air circuit breaker at various interrupting capacities up to the maximum of their high power laboratory.

This compressed air breaker, a newly developed device, was tested on power interruptions ranging from the opening of normal load current of 2000 amperes at 13,000 volts to the three-phase, 1,500,000 kva short circuit capacity of the high power laboratory. Oscillograms were taken during the demonstration, and all currents were interrupted at the first current zero with about ½ cycle of arcing, and throughout the entire range of tests no transient voltage greater than twice normal was observed.

At the completion of the test the breaker was dismantled to show the guest utility and industrial engineers the exact condition of both the stationary and moving contacts after the series of operations.

A second series of tests was applied to a smaller air breaker utilizing an adaptation of the De-ion principle. The three-phase, 2300-volt unit tested had a normal rating of 1200 amperes and an interrupting capacity of 150,000 kva. Opening a short circuit of approximately 175,000 kva, this breaker cleared all faults within ½ cycle of arcing.



Westinghouse Compressed Air Breaker.

The demonstration and the performance of both of these breakers apparently favorably impressed the 200-odd utility and industrial engineers who witnessed the demonstration.

Good Interest Shown in New Distribution Transformer Standards

RECENTLY announced new standards for distribution transformers, as covered by the First Report of the EEI-NEMA Joint Committee on Standards for Distribution Transformers, are commanding much interest in the industry.

There is an expressed desire to become acquainted with these standards and informed as to practical application in advance of commercial availability next July. In response to numerous requests, the Joint Committee is repeating presentation of its report and transformer mounting exhibit at various geographic utility association meetings. This is the same assembly of transformer tanks equipped with the standardized mechanical features as set up at the recent St. Louis meeting of the EEI Transmission and Distribution Committee. These local presentations to date include Wisconsin Utility Association in Milwaukee; Southeastern Electric Exchange in Jackson, Miss.; Pennsylvania Electric Association in Altoona; local group AIEE, Dallas, Tex.; Missouri Valley Electric Association, Kansas City, Mo.

In each of these presentations, representatives of both EEI and NEMA, active in the Joint Committee in preparing the standards, are in attendance for a detailed description of standardized features and to answer questions. These representatives report keen interest on the part of engineers and operating men, active discussions and recognition of opportunities for convenience and economies from utilizing the standards in their individual situations.

The Joint Committee is continuing its work on further perfecting a few remaining items in the smaller sizes covered by its First Report, and on its next undertaking of extending the standards into the larger size pole type transformers.

Short Wave Emergency Stations Are Supplemented by Amateur Stations in N. E. P. A. System

By William J. Belleville and Wendell Phillips

From articles in December and March issue of *Contact*

ANOTHER step to insure the reliability and continuity of electric service under all conditions for its patrons has been completed by the New England Power Association with the recent installation of short wave radiotelephone and radiotelegraph system between two principal points in the Association's territory, 80 miles apart, to be operated on licenses issued to New England Power Company by the Federal Communications Commission.

Smooth functioning of the short wave stations, even in the initial tryouts, has convinced officials that in emergencies, when normal communication service is crippled, the system's stations will have inter-company communication. Establishment of the Millbury and Shelburne Falls stations may be but the start of a system that will link all pivotal points.

Value of short wave service in emergencies was so emphatically proved in the hurricane of September 1938, that from then on NEPA officials were decided upon establishment of licensed emergency short wave stations. At that time amateur short wave operators established a communication system by a series of relays that helped speed up the work incident to service restoration.

Completion of the duplicate short wave stations at Millbury and Shelburne climaxed months of planning, and now two-way radio contact between these points in the event that normal wire service is interrupted is always possible.

Communication is possible on either of two channels. One is reserved for radiotelephone contacts, the other for radiotelegraph. On the radiotelephone channel, the frequency employed is 2726 kilocycles. For the radiotelegraph, the frequency used is 3190 kilocycles.

Transmitting units were designed and built in accordance with specifications furnished by New England Power Association system. Power output from these units is 250 watts on both radiotelephone and radiotelegraph channels. Instant changeover from one channel to the other is effected by means of a master switch located on the front of each transmitter. The units are crystal controlled to insure frequency stability, a separate crystal having been provided for both the 2726 kilocycle and the 3190 kilocycle channel.

Receiving equipment at each of the stations consists of an AC operated, type HRO short wave receiver. The receivers are designed to intercept all radiotelephone and radiotelegraph frequencies between 1.7 megacycles and 30 megacycles.

Transmitting and receiving equipment located within the buildings at Millbury and Shelburne connect with antenna rigging located some distance from these buildings. Outside each of the stations are two wood masts, approximately 80 feet above ground, and these support the half-wave, single-wire, center-fed, transmitting antennas at each of the stations. The effective length of each antenna is 158 feet. Each antenna is oriented to radiate maximum energy in the direction of the other station.

Energy from each of the transmitters, is carried underground through a nitrogen-filled coaxial transmission line to the antenna tuning network, which is mounted in an aluminum housing on a short stub pole outside the station near the center point of each antenna. Quarter wave, open wire feeders transmit the energy from the antenna tuning network to the antennas.

A separate, single wire antenna is employed at each station for receiving.

It is, of course, the plan of New England Power Association to use the stations only in cases of emergency, but it is expected that there will probably be weekly tests to insure that the system is in readiness at all times.

When step number two in the system's emergency communication program — carrier-current telephony — is completed, New England Power system will be able to boast of three complete and distinct mediums of communication. With short wave radio, carrier-current telephony and straight telephone at its disposal, the system is as completely equipped for emergencies as it is humanly possible to be.

Installation of the station at Shelburne has aroused keen interest among residents of that section, who visualize that it can be of great benefit to communities in the western part of the state in event of hurricanes or floods. Establishment of the stations is winning NEPA praise for its efforts to provide the last word in preparation to combat emergencies.

Reflecting the feeling of persons in that section, an editorial which appeared in the Greenfield *Recorder-Gazette* pointed out:

"Although these radio stations, like the water storage reservoirs, are primarily for the business of the company, the stations, like these dams, are likely to prove of wide public benefit in times of emergency. It is not expected that the stations, even if at some times they should be the only means of communication, could handle much personal traffic, but they could exchange all the official information desired.

"The cost of such a system must be great and the use of it in substitution for public wires in normal times will do little to offset this expense. A power company, however, prides itself on the extent to which it is able to deliver continuous service and to this end it is not likely to stop at expense."

A rough canvass of the system personnel some time ago disclosed a gratifying number of licensed amateurs scattered about the member companies and a circular letter to them broaching the subject of forming an emergency communication radio net brought such an enthusiastic and hearty response that

before the end of 1938 such a unit was formed. Since that time this group has been in active operation every week, except during the summer months.

At the present writing, the net is composed of 20 radio-telegraph stations operated by system employes. At least four other employes are in various stages of preparation to participate in the net and we hope that they, too, will be with us in the not too distant future.

Due to the wide divergence in telegraphic experience among members, the net has been divided into two groups, one meeting on the air Monday nights at 9:30 p.m. and operating at 25 words per minute; the other meeting Tuesday nights at the same hour and operating at 15 words per minute. The frequency (and wave-length) of each of these 20 stations' transmitters is crystal controlled with a suitable crystal so that no station departs more than about one-half a kilocycle from the nominal net frequency of 3575 kilocycles. This feature is essential to operation in that it makes it possible for any station to hear any other station of the net at any time without the necessity of moving the tuning dial of the receiver.

It's the same as grouping all members of the net into one room where one or all can be addressed at will; a considerable improvement over the situation which obtained immediately following the '38 hurricane when it was extremely difficult to contact available operators.

If a disaster threatens, those net members who are conscious of the situation and available, simply go to their transmitters, tune to the net frequency and immediately know what, if any action, is going on in the net. If no other net member is heard it is only necessary to transmit "PCN" (our net call) a few times and sign with the member's own station call. Such action will bring instant response from other "PCN" stations which are listening. It is thus possible to assemble a net practically immediately.

Net members practice this procedure every week of the fall, winter and spring seasons. Due to the fact that any net station can be heard by all other net stations, all communication, when more than two stations are assembled on the air at one time, is under the direction of a "Net Control Station" or dispatcher who makes a record of what messages each station has to dispose of as it reports in to the net. After the net is assembled, the dispatcher orders the necessary transmission to "clear" the traffic.

Our net drills usually consume about one hour, and are as follows: (1)—Net control station calls the net. (2)—Members report in to the control station, advising what, if any, messages they have to send to other members, usually giving the net control a signal strength report of his signals. (3)—Directed exchange of any inter-net messages the members have. (4)—The transmission of the net control station of any special information which it is desired be broadcast to the net members. (5)—The transmission by the net control station of some problem to be worked out by the member stations. Its nature has varied from a series of multiplications and divisions to simple aeroplane navigation flight problems. (6)—The working out of the problem and preparation of answer in correct telegraph message form for transmittal back to the control station. (7)—Reporting of completion of problems to the control station. (8)—The transmitting of these messages to the control and getting check on correctness of the answer. (9)—Announcement by the net control of change from "directed" to "free" net, after which the members "rag chew" among themselves at random as long as they desire.

Practice is just as important in radio operation as in golf or bowling or any other sport. For net operation which is essential to accomplish our objective, team practice is just as necessary as in football or basketball. The weekly grind the boys go through improves them as operators and helps to build up a system of communication capable of handling thousands of words a day.

In spite of the fact that no amateur can receive compensation in any way for operating his radio station the boys have given unstintingly of their time to support and carry on the net. In many cases they have made substantial cash expenditures either to get back "on the air" for the express purpose of participating in the net, or to improve their radio equipment so it will do a more reliable job.

One of the boys, Alex Tremblay at St. Johnsbury, has even gone so far as to build himself a gasoline engine driven generating set as a precautionary measure. Another, Elmer Turner at Watertown, has a similar outfit under construction.

Many have asked why telegraph was chosen for our net instead of telephone. A telegraph station can cover two or three times the distance a telephone station can using the same power.

Since radio telegraph stations only require from one-half to two-thirds as much equipment per watt of output as radio telephone stations, the choice from the practical standpoint is obvious. Furthermore, telegraph signals can be tuned in the receiver much more sharply than is possible with telephone signals, thus eliminating interfering stations in our densely crowded amateur frequency bands. Another feature is the ease with which dots and dashes can be recognized in contrast to the complex sounds of the human voice. This factor alone means more dependable and accurate transmission of information. The only drawback to telegraph is the training and experience necessary to send and receive code well, and at reasonable speed. That faculty comes only with practice and the net members deserve much credit for the spirit in which they have attacked this part of the job. There are many examples of men in "PCN" who have added from 50 to 100 per cent to their copying speed in the year this net has been in operation.

Summer Courses for Engineers at Armour Institute

ARMOUR INSTITUTE OF TECHNOLOGY, Chicago, according to an announcement made by Dr. L. E. Grinter, vice-president and dean of the graduate division, will conduct a three-term Summer Graduate Institute for engineers, professional men, industrialists, and educators in engineering and science beginning with the summer of 1940. It is planned, according to Dr. Grinter, who is in charge of the Summer Institute beginning with this year, to invite scientists of great distinction to lecture each summer on modern developments in engineering and science.

This Summer Institute is divided into seven separate and distinct divisions including one covering Electrical Engineering and Physics. The program of specialized classes has been arranged to provide an opportunity for graduate work on the highest possible plane.

The typical Summer Graduate course will meet for the equivalent of two hours lecture daily, including Saturdays for four weeks. The first term of the Summer Institute will extend from June 17 to July 13; the second term from July 15 to August 10; and the third term from August 12 to September 7.

Advantages and Economies in Installation of Precast Manholes by the Caisson Method

By Ernest Williams
Consolidated Edison Company of New York, Inc.

ADVANTAGES OF THIS TYPE OF CONSTRUCTION:

(1) No shoring is required.
(2) Greater safety is provided for the men within the excavation.
(3) Less material is stored in the street during construction.
(4) The job is completed within a day; previously 5 days were required.
(5) Traffic obstruction is greatly reduced.
(6) No provision need be made against concrete freezing in the winter months.
(7) Manholes may be poured under ideal shop conditions.
(8) The placing of the steel reinforcement is performed in the shop by closely controlled mechanized methods.
(9) No transportation of forms is required.

Economies of the order of 20 to 35 per cent have been achieved by using the new method. Further savings are expected as additional experience is gained.

ELECTRIC utility companies are continually searching for methods of improving the distribution system, both economically and structurally. The use of precast concrete boxes and ducts has contributed to this end.

Generally, it has been assumed that where the depth of the hole or the condition of the soil required shoring, the utilization of precast boxes was not outstandingly advantageous.

The method of installing large boxes or manholes which is described in this paper makes unnecessary the utilization of sheet piling or shoring and realizes all of the advantages which experience has shown accrue from the use of precast boxes.

The utilization of precast concrete distribution boxes in the construction of underground electric conduit systems has been the standard practice of the Consolidated Edison Company of New York, Inc., for a number of years. This practice was adopted because of the economies which result from the continuous production of boxes at one central point under ideal conditions together with the elimination of the necessity for setting forms in the field, mixing or procuring ready-mixed concrete and the elimination of lost time waiting for the concrete to set before the forms could be removed. Reduction of the hindrance to traffic by reducing the total time the street had to be kept open was a further important advantage. The cost of transportation of forms was also eliminated and the labor involved in removing, straightening, oiling and otherwise caring for forms was materially reduced.

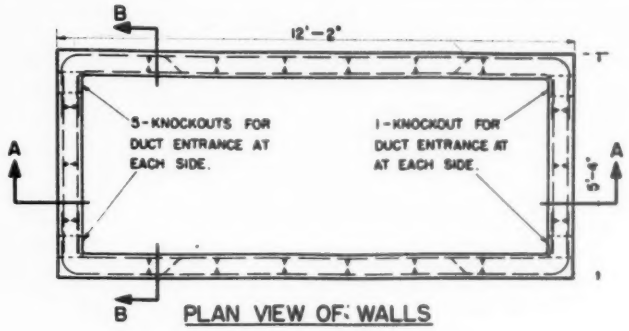
Until recently the maximum size of distribution box which was precast had internal dimensions of approximately 32 in. x 32 in. x 26 in. All boxes or manholes exceeding these dimensions were poured in place in the field. It has now, however, been found feasible to install precast manholes and to realize the same advantages as with the distribution boxes.

Editor's Note:
Detailed data on the precast manholes described in this article are available in "Design Features and Use of Distribution Boxes and Manholes Recently Developed by the Consolidated Edison Company of New York, Inc." by W. C. Kochendoerffer and "The Caisson Method of Installing Manholes and Similar Sub-surface Structures," two studies presented before the Transmission and Distribution Committee, E.E.I., at the St. Louis meeting in February, 1940.
Copies may be obtained from the Edison Electric Institute.

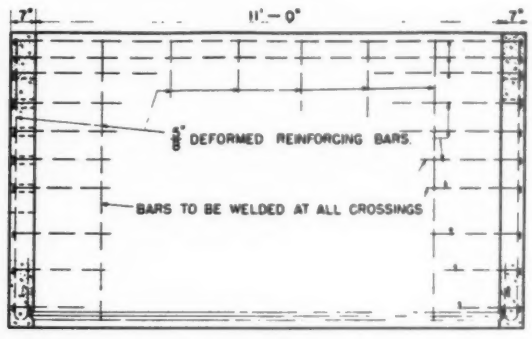
The method heretofore used in installing precast boxes has been the most obvious one, as well as the simplest for relatively small boxes, of digging a hole large enough to accommodate the box to be installed and lowering the complete box into place after which it was secured in position by backfilling and tamping around it.

The same method might have been followed in the installation of the considerably larger manholes contemplated. It was at once recognized, however, that an excavation for a manhole having head-

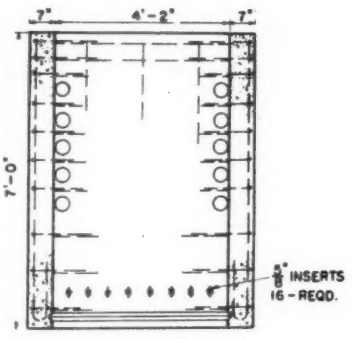
Fig. 1—Manhole walls are lifted from the trailer and lowered into the shallow excavation.



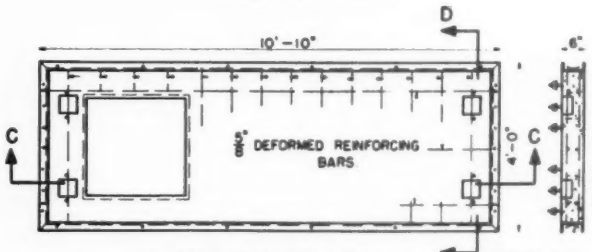
PLAN VIEW OF WALLS



SECTION A-A



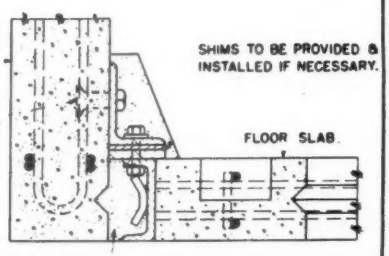
SECTION B-B



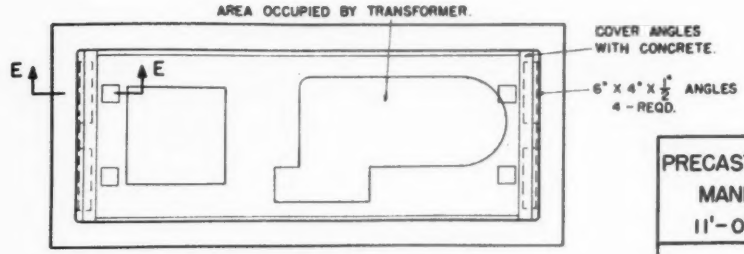
PLAN VIEW OF FLOOR

2'-4" X 2'-4" OPENING FOR PRECAST CONCRETE SUMP PIT.
4-5" X 5" HOLES 3" DEEP TO BE FILLED WITH MORTAR AFTER SLAB IS INSTALLED
5/8" MACH. BOLTS SPOT WELDED TO CHANNEL. 12-REQD.

SECTION C-C


SHIMS TO BE PROVIDED & INSTALLED IF NECESSARY.
FLOOR SLAB.
WHEN FLOOR & WALLS ARE IN PLACE CAULK WITH WATER-PROOF CEMENT MORTAR.

ENLARGED SECTION E-E



ASSEMBLED WALLS & FLOOR

PRECAST CONCRETE TRANSFORMER MANHOLE WALLS & FLOOR 11'-0" X 4'-2" X 6'-6" MANHOLE

FIG. NO. 2

room of approximately six feet would require the use of sheet piling and that to handle the weight of a manhole having inside dimensions of approximately 11 ft. x 4 ft. x 6½ ft. would require a crane having a capacity in excess of ten tons.

The "caisson" method of installation adopted has eliminated the need for shoring the excavation and the manhole design evolved to make possible this method of installation has accomplished a reduction in the maximum weight to be handled by the crane.

Design

To permit the installation of the manhole as a caisson the structure was designed to consist of three separate main items, namely:

(1) Precast walls
(2) Precast floor and accessories
(3) Precast roof and accessories

Strength calculations for resisting external loads were based on a wheel load (Highway Loading Designation H-20) equivalent to 16,000 lbs plus 40 per cent for impact or a total concentrated wheel load of 22,400 lbs in addition to static earth pressure developed for the full depth of the manhole and hydrostatic pressures for water bearing soils.

The design of the side walls of all the types of precast manholes is based on continuous horizontal reinforcement which may be provided by bent overlapping steel bars or by the equivalent in expanded metal for economical assembly and ease of placement in the forms. Horizontal reinforcement placed as described enables the four walls to withstand the external loads mentioned independent of the floor and roof and imposing no stress in the bonds between the floor and walls.

Windows or knockouts, are provided when precasting the walls so that the ducts of the underground conduit system may easily be extended into the manhole. A sufficient number of these knockouts may be left so that they will accommodate a variety of duct formations and eliminate the need for breaking through the walls when non-standard formations are encountered. The duct windows are also useful as a means for attaching the crane slings to permit handling before installation. This is illustrated in Figure 1.

When the manhole is intended to contain transformers or reactors a means of transferring load from floor to sidewalls must be provided. Such is the case in the manhole illustrated in Figure 2 which is designed to house a 500 KVA submersible type network transformer with its network protector. This type of manhole was chosen to illustrate the design and installation of precast manholes in this paper since it includes not only the essential features of the cable manholes but some additional features not found in the cable manhole designs.

As will be noted in the "Enlarged Section E-E" of Figure 2 the floor is so bolted to the end walls as to form in effect two longitudinal beams which distribute the transformer weight to the end walls. Bonds between the walls and the floor being along the long sides carry no load but provide a water-tight seal.

While four sections of 6 in. x 4 in. x ½ in. angle iron bolted to inserts in the walls and to the channel frame of the floor tie the floor "beams" to the end walls, the keying of the grout on all four sides is accomplished by leaving a V-shaped groove in the inner surfaces of the walls near the bottom edges and opposite the channel frame of the floor slab. The grout flows into these grooves and into the floor channel and is thus keyed.

Four shallow square holes, across each of which a reinforcing rod extends, are left in the floor to furnish a means for attaching the hooks of the crane slings when handling the slab. These holes are filled with concrete after installation of the slab. Another hole is left in the floor for the installation of a precast sump

Fig. 3—As dirt is excavated from within, the manhole walls sink.

provided with a sewer connection. This sump is also grouted in place in the field.

The roofs of precast manholes present no significant departures from the types heretofore used on manholes poured in the field and do not require detailed discussion. They consist of suitably reinforced concrete slab sections and grating sections to provide ventilation and a means of entrance to the hole.

The roofs of the transformer manholes form a part of the street surface and are completely removable at any time so that equipment may easily be removed if necessary. The roofs of the cable manholes are usually about 18 inches below the street grade and for such manholes precast chimneys are used to provide access.

Because it is the practice to install underground conduits as close to the curb line as possible, cable manholes are generally partially under the sidewalk area and partly under the street so that a section of the curb has to be broken to permit installation of the manhole. The precasting of concrete parts in the shop has therefore been extended to include sections of curbing for replacement of the curbs broken.

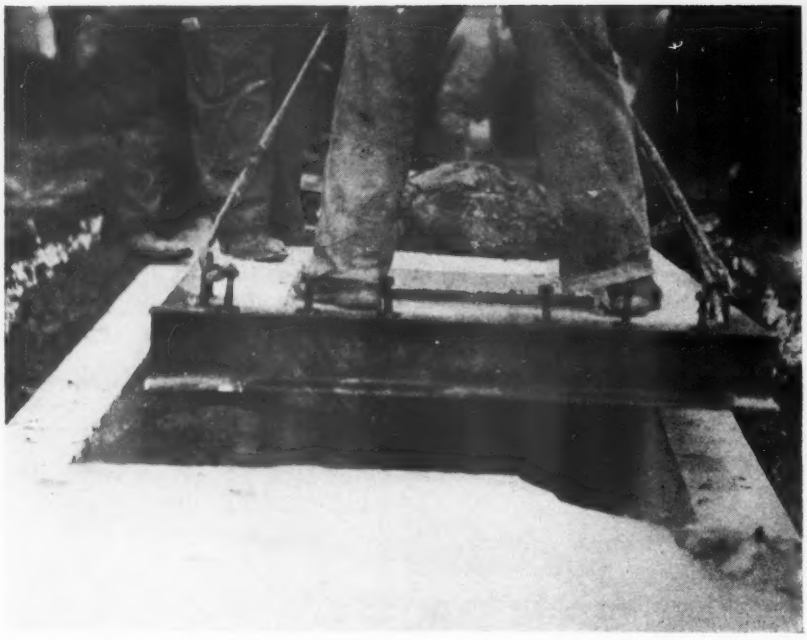


Fig. 4—The floor is placed in the manhole. (Note bolts in end channels for attachment to angle irons.)

Installation

When installing precast manholes it is, of course, necessary to insure that no subsurface structures such as sewer, water, gas or steam pipes lie within the area where the manhole is to be placed. Subsurface maps may usually be relied upon to provide this information, but where doubt exists, the presence of metallic substructures may be detected by means of an exploring device which sends out electrical impulses along metal pipes. An operator wearing a telephone headset connected to a receiver can hear these impulses as audible signals indicating the positions of the pipes.

After it has been determined that the area is free of interferences the pavement is broken and removed. The manhole is delivered to the location on a trailer and the wall section is lifted from the trailer by means of a crane and lowered into the space from which the pavement was removed (Figure 1).

Figure 3 illustrates the method of sinking the manhole by excavating from inside the walls to a depth of about two feet below the bottom edges of the manhole walls using a mobile crane having a three-eighths cubic yard clam shell bucket. After excavating to this depth two men are sent into the manhole to loosen the dirt remaining under the walls, allowing the manhole to sink slowly. This process is then repeated

Fig. 5—The floor and sump have been grouted in place, the holes used for lifting walls and floor have been cemented and the angle irons have been encased with cement. The manhole is now ready to receive the transformer.

Fig. 6—A 500 Kva Transformer with network switch is being installed.

Fig. 7—The roof frame is set on a bed of mortar.

until the manhole has been lowered to the required depth.

The dirt floor is next leveled and tamped and is then ready to receive the precast floor slab. The placing of the floor is shown in Figure 4. This slab when in place is bolted securely to the end walls by means of the four angle iron sections referred to in the discussion of the design. The next step is the placing of the precast sump after which the grout may be poured around the sump and floor, and the angle irons may be encased in concrete. If the duct entrance windows used for lifting are not required for the particular installation, they, as well as the floor holes used for lifting, may be filled with cement at the same time. Figure 5 shows the installation at this stage.

Since the floor and walls have been securely bolted together the transformer may be installed at once before the roof sections are placed. This is pictured in Figure 6.

After this has been done mortar may be laid on top of the walls as a bed for the roof frame (see Figure 7). Finally, the roof sections are placed in the frame and, as soon as the ducts have been introduced through the duct knockouts, the excavation around the manhole may be back-filled and repaved. Figure 8 shows the completed installation ready for back-filling and repaving. In this figure may also be noted on the long sides of the frame the use of short lengths of Z section iron, one flange of which projects downward parallel to and about three inches away from the side walls. These serve to anchor the frame to the concrete paving base and assist in preventing lateral movement of the frame.

As mentioned previously this discussion of the design and installation of precast manholes by the caisson method has focussed attention chiefly upon the transformer type of manhole. Some of the differences between this and the cable manhole have been touched upon, such as the use of chimneys and precast curbs with the cable manhole. Other differences may be noted briefly here.

It is not necessary in the cable manhole to bolt the floor and side walls together since no load is imposed upon the floor other than the external pressures which act upon every manhole. Consequently a bond of grout between the floor and walls, keyed as on the sides of the transformer manhole is all that is required.

Since it is not the practice to install sewer connections to cable manholes, no sump is provided. The four holes in the floor for lifting purposes extend through the floor and in dry locations these are filled with sand forming drains for the manhole. In wet locations they are filled with waterproof cement mortar.

Advantages

At present the development of this method of manhole installation has been advanced to the stage where one crew operating the mobile crane can install four cable manholes in an eight-hour working day. The mobile crane equipped with an excavator bucket which is used for installations on the Consolidated Edison

System is shown in Figure No. 9. This unit is also equipped with an air compressor which supplies pneumatic pavement breakers, air-driven wrenches, etc. Proper coordination of the work to insure delivery of the manholes and supplementary materials and proper scheduling of the power equipment are essential to this as to any economical job of field construction work.

The advantages of this type of construction may be summarized as follows:

1. No shoring is required.
2. Greater safety is provided for the men within the excavation.
3. Less material is stored in the street during construction.
4. The job is completed within a day; previously 5 days were required.
5. Traffic obstruction is greatly reduced.
6. No provision need be made against concrete freezing in the winter months.
7. Manholes may be poured under ideal shop conditions.
8. The placing of the steel reinforcement is performed in the shop by closely controlled mechanized methods.
9. No transportation of forms is required.

Economies of the order of 20 to 35 per cent have been achieved by using the new method. Further savings are expected as additional experience is gained.

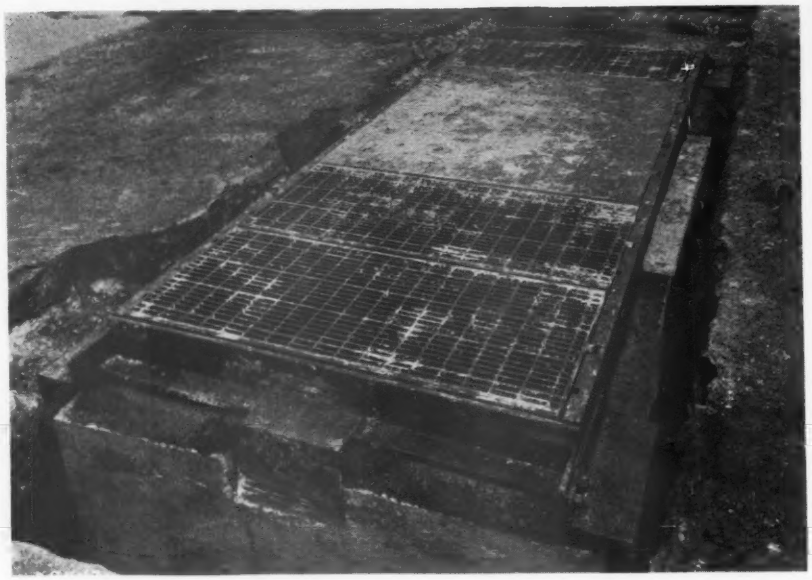


Fig. 8—The completed installation ready for back-filling and repaving.

Fig. 9—The mobile crane used for caisson manhole construction.

Northwest Association Business Development Section Meeting

APPROXIMATELY 300 delegates attended the 15th annual meeting of the business development section of Northwest Electric Light & Power association, held at Seattle, Feb. 29-March 1.

J. E. E. Royer, vice-president, Washington Water Power Co., Spokane, and president of the association, pointed out the many fields for load development and the potentialities of each, and urged that particular stress be placed on securing new industries for the region.

Samuel P. MacFadden, vice-president of the Puget Sound Power & Light, outlined his company's dealings with the public utility districts that have instituted condemnation proceedings against the company looking toward the purchase of the company's properties in their respective districts.

Speaking on the value of a home service department to the utility, Ralph E. Gale, sales manager Idaho Power Co., pointed out the numerous rate reductions in the territory, and emphasized the necessity of getting the customer to make more use of his present equipment to make up this lost revenue. A well-trained home service department can do more to secure this increased revenue than any other division of load-building operations, he said.

V. H. Moon of the Central Service Corp., Chicago, showed by analysis how it was sometimes more profitable from the "net" standpoint to add load that earned a gross of 3 cents per kilowatt-hour than load earning a gross of 5 cents, thus bringing out the necessity for analyzing proposed load-building programs.

Electric Range Oven Temperature Measurement

By T. H. Swisher

Range Research Division, Edison General Electric Appliance Co., Inc.

EVERY electric range manufacturer wants to produce ovens with uniform cooking performance. In the testing laboratories of several manufacturers, there are records to prove that they are producing ovens having uniform cooking performance. Authors of cook books, and home economics editors of women's magazines and newspapers, know that their recipes will produce perfect results if the oven temperature is correct. So do home economists of electric utilities and food manufacturers. Independent testing laboratories put their approval seals on electric range ovens which perform satisfactorily in their laboratories, by their test methods.

Why, then, in spite of the best efforts of all these experts do homemakers find that some recommended temperatures do not produce the desired results in the ovens of their ranges? The range manufacturer, the utility company or dealer from whom she purchased her range, or any of a number of agencies who supply her recipes, might receive the brunt of this seeming inaccuracy. Yet she can't be blamed for feeling that someone has been fooling her.

Actually, nobody is wrong!

The range manufacturer tests oven performance by one method, the utility company often uses another method, and the foods home economist still another. When Mrs. Homemaker buys her range, she gets recipes from many sources—each one calling for a temperature based on a different method of measuring oven temperature.

Because there are now in general use, seven distinct methods of measuring oven temperature, no two of which would measure the same average temperature for any one particular oven, Mrs. Homemaker cannot, at this time, even hope to get perfect results from all her recipes —some must be perfected by the trial-and-error method. These various methods of oven temperature measurement are as follows:

1. Household-type mercury or bimetallic thermometers.
2. One bare thermocouple in the center of the oven.
3. Five bare thermocouples in a horizontal plane.
4. One "shielded" thermocouple in the center of the oven. (There are at least three different types of "shields.")
5. Five "shielded" thermocouples in a horizontal plane.
6. Five thermocouples each with a "heat-absorbing disc" attached.
7. The Thermosheet.

Modern electric range ovens are all equipped with the off-on type of temperature control. This produces a continual controlled variation in oven temperature. Tests have been made wherein baking results with the variable off-on type of control (maintaining oven temperature variation, or amplitude, within certain reasonable limits), were compared with results in the same preheated oven manually held at constant uniform temperature by means of an induction voltage regulator. There was no observable difference either in cooking time or in the appearance of the products, provided the *average temperature* was the same in both cases.

If any oven (either electric or flame-type) could be maintained at a constant temperature, with the walls and the air at the same uniform temperature, all of the seven methods of measurement would give exactly the same temperature reading. It is the continual variation in temperature of the heating units, the oven walls, and the oven air, occurring in all ranges, which introduces the difficulties of measurement. "Cooking effect" in an oven is a combination of radiation, air temperature, and direction and rate of air circulation; a suitable temperature measuring device will properly integrate these various components into the common denominator of cooking effect; namely, degrees Fahrenheit.

It is commonly believed that heat transfer in ovens is mostly by convection, and very little by radiation. It was known that radiation in an oven confused temperature measurement. Attempts were therefore made to eliminate the error in temperature measurement produced by radiation, by shielding the thermocouple junction from the radiation of the top and bottom oven heating units, the junction being held in a piece of aluminum tubing. A little study will show the fallacy of this method for standardized use.

The most intense heat in an electric range oven comes from the broiling unit, and is practically all radiant heat. Should we disregard a type of heat which is capable of burning the tops of cakes to a black crisp in a few minutes? Of course not! And here is why.

One investigation has shown that of the heat available in an electric oven at 400 F. 66.8 per cent is radiation, 33.2 per cent is convection. (Electric Range Oven Performance by Littleton and Phillips—*Electrical World* 100, 1932, October 15—pp. 527-529.)

Theoretical considerations in baking a cake, for example, also show that radiation plays an important part. For purposes of illustration, consider a hypothetical oven with an enameled lining at 400 F. and the air temperature at 400 F. Let us place a cake in an aluminum pan in this oven. We want the cake to be uniformly browned, top and bottom, and will assume that in order to do this the heat applied per unit area must be the same, top and bottom. As the crust of the cake is at 250 F. for a considerable portion of the baking period, we will consider the heat transfer from a 400 F. oven to a 250 F. cake, using round numbers for simplicity.

Of the heat transferred by convection, there will be 105 Btu per sq ft per hour to the top, and 200 Btu per sq ft per hour to the bottom, assuming that the top is flat and that the temperature gradient through the pan to the cake is negligible.

The amount of heat transferred by radiation is much greater to the exposed top of the cake than to the bottom of the aluminum pan, due to the difference in the radiation characteristics of the two different materials. The coefficient of absorptivity by radiation has the same numerical value as the coefficient of emissivity for any one material; both emissivity and absorptivity are commonly referred to as emissivity. The emissivity of highly polished metals is very low. The emissivity of most non-metals is above 0.8. The emissivity of foods, including bread, pastry, and meat, is of the order of 0.9 to 0.95. Color is not an appreciable factor because the radiant

energy is practically all in the infra-red part of the spectrum.

For the heat transferred by radiation, assume the cake has an emissivity factor of 0.9, the aluminum pan a factor of 0.1. Of the heat transferred by radiation, there will be 433 Btu per sq ft per hour to the top of the cake, and 50 Btu per sq ft per hour to the bottom of the cake.

Total Btu per sq ft per hour: Top—538. Bottom—250.

We would expect a cake in this oven to be light on the bottom. Actually, this is taken care of in electric range ovens by increasing the radiation and convection produced by the higher wattage and by the design of the lower baking unit.

These figures are presented here merely to show that the transfer of heat to food in an oven, both by radiation and convection, is directional, and that the percentage of radiant heat going to the top of a cake, for example, is quite appreciable, being in this case over four times as much as the heat transferred by convection.

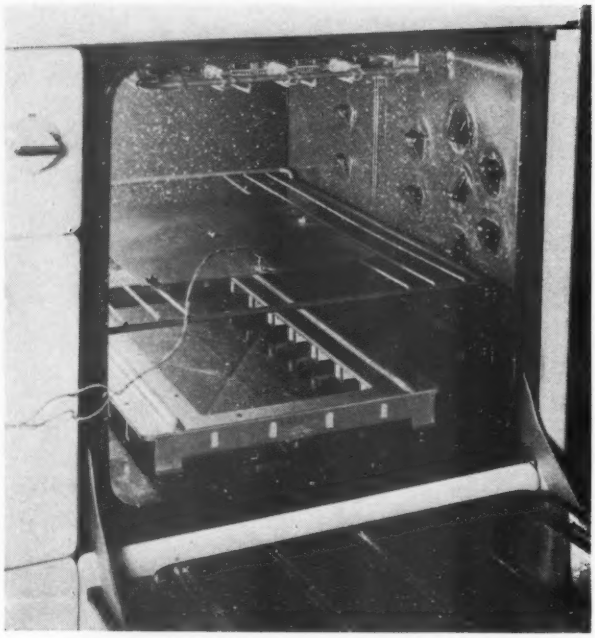
Since this is true, should we not use a temperature measuring device which takes this into account, rather than try to "shield" the thermocouple from radiant heat in the oven?

The air currents in an oven loaded with food are different than in an empty oven. This affects the performance of the thermostat, depending on its type and location.

Food and utensils in an oven also intercept radiant heat, so that conditions of radiation are different in a loaded oven than in an empty oven.

Cakes represent the foods most critical to oven temperature. Aluminum cake pans are generally regarded as being the most satisfactory for home use. Ovens are therefore usually designed to give the best possible results with cakes in aluminum pans.

With the above thoughts in mind, an oven temperature measuring device known as a Thermosheet has been developed. It consists of a 10″ x 12″ sheet of 0.031″ stainless steel, blackened on top and bright on the bottom, to the center of which is attached a 24-gage (0.020″) iron-constantan thermocouple.



Thermosheet in Use for Production Testing

Following is a list of the advantages of the Thermosheet method of testing:

1. The black top takes into account the effect of radiant heat on the cooking of food, particularly in ovens with top heat.

2. The bright bottom resembles the finish of an aluminum pan.

3. The oven air circulation with the Thermosheet in place is similar to circulation with food in the oven. This tends to make the thermostat performance under test conditions more nearly like that of a loaded oven, than is the case with bare or shielded thermocouples.

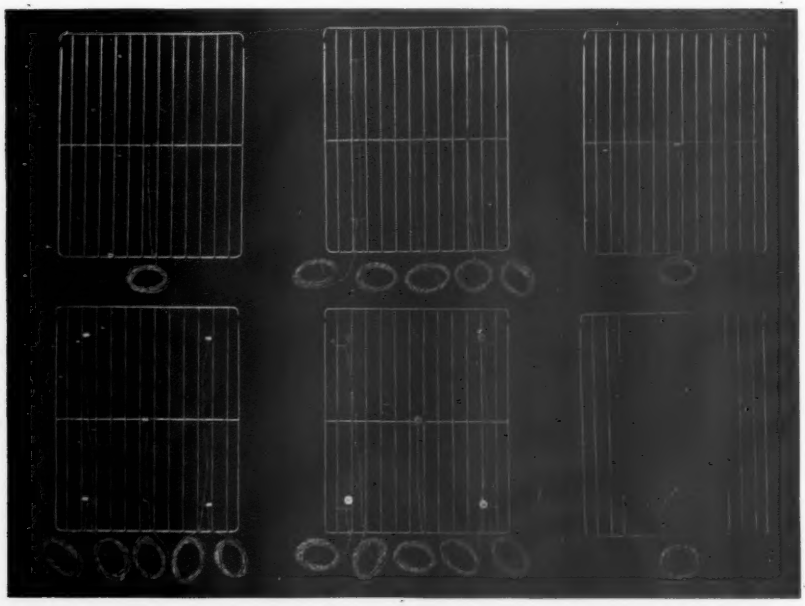
4. The radiation with the Thermosheet in place is similarly more like that of a loaded oven than when using bare or shielded thermocouples.

5. The heat mass of the Thermosheet being greater than that of bare or shielded thermocouples, makes the arithmetical average of the maximum and minimum temperature of a heating cycle more nearly the weighted average than that of bare or shielded thermocouples.

6. On the other hand, the heat mass of the Thermosheet is considerably less than the smallest food item ordinarily cooked in an oven, namely, a sheet of cookies. Thus the Thermosheet is easily capable of indicating any tendency to burning food that might be caused by the peaks of an excessively high oven temperature amplitude.

7. Where a manufacturer is testing his own ranges in production, the Thermosheet may be permanently attached to an oven shelf, thereby eliminating variables arising from irregular placing of the temperature measuring device. Where different makes of electric ranges are being tested, the Thermosheet is placed on an oven shelf. The black side is of course always up.

(*Continued on page* 120)



Various Methods of Oven Temperature Measurement

National Power Sales Conference to Be Held in April

(Open to Utility Representatives Only)

A NATIONAL Power Sales Conference, sponsored jointly by the Edison Electric Institute and the Southeastern Electric Exchange will take place on Thursday and Friday, April 25 and 26, at Roanoke, Va., with headquarters at Hotel Roanoke. The Conference will be a "closed" one in the sense that the sessions will be open to representatives of light and power companies only.

A full two-day program designed to appeal to the "man on the firing line" has been prepared. Interest already expressed in the Conference by representative utility executives indicates that the attendance will be large and will represent every section of the United States.

The program, prepared jointly by the Industrial Power and Heating Committees of the E.E.I. and the Southeastern Electric Exchange should give everyone who attends the Conference something that he can take home with him and use. This Conference has been built for the man on the firing line—for the man who is doing the job in the front line trenches. Every subject on the program is designed to sell more industrial power.

The location of the Conference has been selected so that the greatest number of men can attend. Roanoke is easily accessibly from North, South, East and West, and is only an overnight trip from Boston, New York, Chicago, St. Louis, Pittsburgh, Atlanta, Detroit and other large industrial centers.

Arrangements made for a "bang up" Conference from the opening gun to the final whistle. Five big sessions will be held, featuring, first of all, the job that is ahead for the Industrial Salesmen. An entire afternoon will be given to Industrial Lighting and Infra-Red Heating, dealing with ways and means of selling. Talks will be made by outstanding Power Sales Engineers and plenty of time given for discussion on these timely subjects.

The first day's sessions will be topped off by a banquet, at which one of the industry's outstanding executives will be the only speaker.

The entire morning of the second day will be turned over to the problems of meeting competition. Four able Power Engineers will discuss ways and means to meet all kinds of competition. Again, there will be plenty of time for discussion. The afternoon of the second day will be taken up with Industrial Customer Relations, Oil Refineries and a symposium on the successful selling of small power applications.

Previous to this year, the National Power Sales Conferences have been held in Chicago in conjunction with the Sales Conference of the Institute. This year, however, it was decided to make the Conference joint with one of the regularly set up Industrial Sales Groups in an effort to take the benefits of the Conference to groups of men who have previously been unable to attend the Chicago Conference.

Program

NATIONAL POWER SALES CONFERENCE

ROANOKE, VIRGINIA, HOTEL ROANOKE, APRIL 25 and 26, 1940

Morning Session, April 25, 10:30 a. m.

Welcome, E. M. CLAPP, Chairman, Industrial Power Committee, Southeastern Electric Exchange
Opening of Conference, H. E. DEXTER, Chairman, Sales Committee, Edison Electric Institute
Executive Outlook, H. M. SAWYER, American Gas & Electric Service Corporation
The Job of the Power Salesman Is to Sell, HARRIS S. BIGELOW, Sales Analysis Institute

***Afternoon Session,* April 25, 2 p. m.**

Selling Industrial Lighting—Its Value as an Entering Wedge for Complete Plant Electrification, ROY A. PALMER, Duke Power Company
Discussion, Industrial Lighting, By Conference
Recent Developments in Infra-Red Heating, HUGH M. ARCHER, Detroit Edison Company
Selling Infra-Red Heating
In Richmond, Va., C. L. LANE, Virginia Electric & Power Company
In Wellsburg, W. Va., A. F. FERVIER, Monongahela West Penn Public Service Company
In Philadelphia, Pa., CHARLES E. RUSSELL, Philadelphia Electric Company
Discussion, Infra-Red Heating, By Conference

Morning Session, April 26, 9:30 a. m.

Fundamentals of Meeting Competition, THOMAS BURNS, American Gas & Electric Service Corporation
Meeting Competition in Refrigeration & Air Conditioning Field, H. CHESTER GAUSE, Alabama Power Company
One Method Used to Meet the Diesel Threat, W. G. MOORE, Texas Power & Light Company
Steam Competition, P. D. LAWRENCE, Virginia Electric & Power Company
General Discussion, By Conference

***Afternoon Session,* April 26, 2 p. m.**

Improve Your Industrial Sales Methods to Increase the Net Income of Your Company, W. A. MOORE, Mississippi Power & Light Company
Selling Electric Service to Refineries, W. H. STUEVE, Oklahoma Gas & Electric Company
Selling Small Power Applications in Ohio, E. M. DORAN, Cincinnati Gas & Electric Company
Selling Small Power Applications in Wisconsin, J. S. MCMILLEN, Northern States Power Company
Discussion, Small Power Applications, by Conference

Dinner Session, April 25, 7:30 p. m.

Toastmaster, C. E. GREENWOOD, Commercial Director, E. E. I.
Speaker, C. A. COLLIER, Georgia Power Company

PUBLICATIONS OF THE INSTITUTE

Pub. No.		*Date Issued*	*Price to Members*	*Price to Non-Members*	*Price to Foreign Countries*
G1	A-C Network Operation, 1936–1937	(8/39)	$0.80	$2.00	$2.10
G2	The Electric Light and Power Industry in 1938	(5/39)	.30	.75	.85
G3	Combustion—1939	(12/39)	.80	2.00	2.15
G4	Electric Metal-Melting Furnaces	(1/40)	.80	2.00	2.15
G5	Cable Operation—1938	(1/40)	.60	1.50	1.60
G6	First Report of E.E.I.-N.E.M.A. Joint Committee on Standards for Distribution Transformers	(2/40)	.25	.60	.70
G7	Turbines, Condensers and Pumps—1939	(1/40)	.70	1.75	1.85
G8	Electrical Metermen's Handbook	(4/40)	2.40	3.60	4.00
G9	Methods of Measuring Radio Noise	(2/40)	.20	.50	.60
F1	Treatment and Inspection of Creosoted Pine Poles	(2/38)	.30	.75	.85
F2	Inductive Coordination of Rural Power and Telephone Systems	(1/38)	.80	2.00	2.15
F3	Distribution Transformer Load Characteristics—1938	(4/38)	1.00	2.50	2.65
F4	The Electric Light and Power Industry in 1937	(4/38)	.30	.75	.85
F5	Design of Switchhouses for Generating Stations and Transmission Substations	(6/38)	.40	1.00	1.10
F6	Lightning Proof Transmission Lines	(7/38)	.60	1.50	1.60
F7	Economical Distribution Transformer Loading and Thermal Performance of Distribution Transformers	(8/38)	.40	1.00	1.10
F8	Test Specifications, Automatic Electric Storage Water Heaters	(10/38)	.20	.50	.60
F9	Conductor Sags and Tensions for Rural Lines	(10/38)	.40	1.00	1.10
F10	Tree Trimming Practices	(10/38)	.20	.50	.60
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E4	Joint Use of Poles, 6.6 and 13.2 Kv, Safety Features	(1/37)	.30	.75	.85
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Feel like a million-and look it
with a modern, ALL-ELECTRIC kitchen
I FEEL LIKE AN OLD WOMAN! KITCHEN WORK IS KILLING ME!
LET US TELL YOU HOW EASY IT IS TO OWN ONE

M.K.B.'s Five New Programs Offer Big Opportunities for Electrical Industry

FIVE smashing new programs offering big profit opportunities to the electrical industry are presented by The Modern Kitchen Bureau in its Over-all Plan Book for 1940.

Four product campaigns and an All-Electric Kitchen Program are fully described and the promotional materials for use with all five are pictured.

Case histories which include complete details of four actual product campaigns —range, water heater, refrigerator and roaster—conducted last year have been included to show just how last year's programs were adapted to local use by individual utilities. Each case history is followed by the corresponding program for 1940, condensed from the Plan Books of the individual programs.

The remainder of the book shows how the four appliances can be promoted in the All-Electric Kitchen program for ensemble or for step by step selling. The All-Electric Kitchen program is designed to sell the idea of the planned, completely electrified kitchen by powerful merchandising of the four major appliances that are the natural stepping stones to the kitchen itself.

Among the promotional pieces included in the All-Electric Kitchen Program are a series of two effective mailing folders which place emphasis on the need for planning NOW to be certain of eventually owning such a kitchen. The reader is advised to get in touch with the sender for detailed information or advice. Space is provided for imprint, and the folders are priced at 4 cents per set of two.

An attractive envelope enclosure establishes the "why" of the modern, all-electric kitchen. Its theme—Plan to Stay Young and Beautiful by Modernizing Your Kitchen—is followed by immediate merchandising of the individual appliances used in the creation of the modern electric kitchen. It sells at $1.50 per 100.

A striking placard for windows or counters invites prospects to learn how easily they can own an all-electric kitchen at the present time. It will provoke inquiries and lead to appliance sales—and it sells for only 55 cents each.

Three booklets complete the series. The first is the Bureau's famous meal book—Meals Go Modern Electrically—completely revised and brought up to the minute. It contains 80 pages of authoritative text and gorgeous color reproductions of the products of electric cooking. It tells the electric range owner how to make the most complete use of her range. It is also a prospect-getter and a creator of sales. It sells for 10 cents a copy.

The Home Office is a 16-page booklet in full colors presenting the modern kitchen story briefly and clearly. May be distributed at meetings and demonstrations, handed out over the counter, or mailed. Its price is $4 a thousand.

How to Plan a Modern, All-Electric Kitchen, the remaining booklet, is a six-page folder which implants the urge to ownership and the incentive to start working toward ownership immediately. It shows why modern kitchen planning saves time, work and drudgery, and explains the principles on which modern kitchen planning is based. As in the

(*Continued on page* 120)

Southeastern Electric Exchange Meeting

MORE than one hundred utility engineers and operators attended the two-day meeting of the Southeastern Electric Exchange held at Jackson, Miss., Feb. 22-23 at which emphasis was placed on economics of power supply.

President C. E. Ide pointed out the many problems of present-day utility management and stressed the necessity for greater efficiency in system engineering and operation.

An outline of the present status of transformer standardization was presented by A. E. Silver and M. F. Mitschrich, and an exhibit showing the standard was given. General comment was favorable to the proposed standards, but several transmission system engineers were glad to learn that taps would be provided on 7200 volt transformers of 10 kv and larger. It was also pointed out that there should be better agreement between preferred voltage standards and transformer voltage ratings. It was agreed that the time is ripe to get some agreement on what standard voltage to use on house service—either 115 or 120.

An outline of practical economies that could be had on a distribution system was given by H. S. St. John of Alabama Power Company and an extended discussion was held on ways and means to save money and improve service. Service to electric co-operatives was another interesting topic, introduced in a paper presented by H. L. Crumley of Virginia Public Service. Practices differ, but the general principle followed is to co-operate fully with the co-operatives.

An interesting paper on demand and kilovolt-ampere meters was presented by W. R. Deavers of Virginia Electric and Power. He stressed the present limitations of existing meters and brought out the need for developments. The thermal type of demand meter was cited as having many advantages over more complicated meters.

A splendid paper on the economic aspects of utility transportation equipment was presented by R. Whitfield of Georgia Power. Discussion brought out the need for supervision and system in handling fleets, but practices varied as to mileage fixed before turn-ins and other topics. Much money can be saved if thorough study and supervision are given to transportation.

A presentation of present and contempated developments in air-blast circuit breakers was given by S. R. Stubbs of Allis-Chalmers, and the discussion showed agreement that this type of breaker should be developed and used because of many apparent advantages. At present, however, little experience has been had in this country under actual operating conditions.

In order to place utility personnel advantageously, C. V. Hussey stressed the need and the value of writing up specifications for all utility jobs and then trying to fit employees and their rates of pay into these specifications. Mississippi Power & Light has completed these specifications and finds them of great value.

At a final session a round-table discussion on current problems and practices was held. R. I. Butterworth, as chairman, presided at the meetings, and R. I. Brown, president of Mississippi Power & Light, welcomed the visitors and headed up the hospitality that made the meetings a success.

New Book on Distribution Fundamentals by Distribution Engineer of Cincinnati Company

"Electric Distribution Fundamentals," by Frank Sanford. 237 pages, 157 illustrations, $2.50. McGraw-Hill Book Company, New York.

This book, by the Distribution Engineer of The Cincinnati Gas & Electric Company, gives the perspective, development, and economic background of electric distribution as a part of the general system of electric supply. It outlines features of both the utility distribution, and the industrial and inside wiring branches of service to the outlet. Practical design problems are included, with solutions based on graphical methods rather than engineering mathematics.

Methods and equipment of distribution are explained by means of comparison and analogy. Emphasis is given to the everyday problems and their relation to the standards and practices that have followed many operating and economic comparisons in past development.

There are included step by step explanations of wire size calculation, line design, transformer connection, power factor improvement, and similar problems. The use of trigonometry and other engineering mathematics is avoided. The graphical solution methods have an advantage of clarifying the factors involved, which is the first essential of any of the more exact mathematical methods of solution.

Mr. Sanford's approach is somewhat different than is usual in books of this kind. It is natural that most books of this type are directed primarily to the attention of engineers and supervisors responsible for planning and operating the systems. The purpose has been to outline present practices and their place in the broad picture. Recent advances are outlined but not covered in detail unless they are general practice.

Examples are used to illustrate the explanations and problems are given at the end of each chapter dealing with design. Answers to the problems are given in the appendix. All of the material is based on notes and review sheets prepared by the author for discussions in educational and group meetings at the Cincinnati Gas & Electric Company during the past few years. Junior engineers, foremen, inspectors, linemen, electricians, clerks, draftsmen and others employed in the company were members of these groups. Practical problems based on distribution engineering contacts with the customer and the layout of lines and transformer stations are used.

The book contains chapters on:

Perspective of the Electric System.
Distribution to Serve the Load.
The Distribution Division.
Generation of Electricity.
Fundamentals of the Electric Circuit.
Inductance and Related Characteristics.
Tools for Electrical Problems.
Transformers.
Transformer Connections.
Voltage Control.
Current Interrupting Equipment.
Voltage Protection — Lightning — Grounding.
Street Lighting Circuits.
Mechanical Principles in Distribution.
Economic Principles in Distribution.
Measures of Service.

PERSONALS

A reorganization of the Portland General Electric Company staff to provide a more efficient and economical operation following separation of the electric properties from the traction properties has been announced by JAMES H. POLHEMUS new president and general manager of Portland General Electric.

GEORGE E. SULLIVAN, formerly general division manager, becomes vice-president and assistant manager. FRED HODGE, who joined Portland General Electric two years ago from the Sierra Pacific Power and Light Co., Reno, Nev., succeeds Mr. Sullivan as general division manager.

RAYMOND E. BRENNAN, formerly controller and assistant treasurer, is now treasurer and controller of the company.

R. R. ROBLEY, formerly operating superintendent, is now assistant to the vice-president.

After nearly a half century of continuous service with the Portland properties, ORIN B. COLDWELL, for 24 years vice-president of the company, retired March 1 as an active vice-president, but will continue to serve the company in the capacity of a consulting engineer. W. H. LINES, who recently resigned as vice-president of Portland General Electric has been elected vice-president and treasurer of the traction company.

WALTER W. R. MAY, who has had the title of manager of the industrial development division, now heads a new public relations department, and RALPH MILLSAP, who has handled advertising and publicity, is the new advertising manager.

Mr. Sullivan, new vice-president and assistant general manager, worked for Portland General Electric and its predecessors during summer vacations and upon graduation from the University of Oregon. In due time he become assist- and hydraulic engineer, later served in the engineering department, as sales manager for the Fortland division, as assistant general sales manager, and in 1937 was appointed general division manager.

As a boy Orin B. Coldwell began to do occasional chores for the old Willamette Falls Electric Company, a predecessor of Portland General Electric Company in 1892. He has been successively electrical engineer, superintendent of the light and power department, general superintendent, vice-president in charge of transportation, and vice-president in charge of hydro-electric development and general construction. Mr. Coldwell has been president of the Northwest Electric Light and Power Association and active in the committee work of the National Electric Light Association and the Edison Electric Institute. He is a fellow of the American Institute of Electrical Engineers and during the World War was active on the War Industries Board.

J. A. LONGLEY, assistant to WALTER H. SAMMIS, vice-president of the Commonwealth and Southern Corporation, has been elected a director of the Ohio Edison Company.

H. E. SIMPSON, formerly secretary and treasurer of the Florida Power and Light Company, has been named vice-president to fill the position vacated when MCGREGOR SMITH was elected president of the company last fall. WILLARD R. BLACKWOOD, formerly assistant treasurer of the company has been named as treasurer. MALCOLM B. MCDONALD, heretofore assistant to the president, has been elected secretary, and A. F. HENDRICKS, of the accounting department, was promoted to the position of assistant treasurer.

MR. SIMPSON has been associated with the Florida Power and Light Company since it was organized in 1924. He was formerly connected with the Dallas Power and Light Company, Dallas, as an accountant.

HOWARD B. CHURCHILL has been elected an assistant controller of Niagara Hudson Power Company. He was formerly assistant controller of New York Power and Light Corp., an operating company of the Niagara Hudson system.

TOM C. POLK, prominently identified with the utility industry in Indiana, has been appointed director of safety of the Illinois Iowa Fower Co., Decatur, Ill. For a number of years Mr. Polk served as secretary of the Indiana Electrical Association and of the Great Lakes division of the old National Electric Light Association.

JOHN W. LAPHAM has resigned as industrial and agricultural agent of the Minnesota Power and Light Company. Mr. Lapham is well known in the industry in the North Central area, having served for many years as secretary of the North Central Electric Association.

FRED H. PHILLIPS has been appointed resident sales manager for the Arkansas Power and Light Company, Pine Bluff, Ark. He succeeds MAX SUDDUTH, who has assumed the duties of assistant general sales manager.

H. P. SEDWICK has been appointed general manager of the Public Service Co. of Northern Illinois and will assume the duties heretofore delegated to the general division manager. C. G. BENNETT has been appointed manager of rates and industrial sales and J. R. PERSHALL, manager of merchandise sales and advertising. Mr. Fershall and Mr. Bennett will report to the general manager of the company.

Mr. Sedwick started with the company in 1913 as an assistant inspector at Evanston. Four years later he was transferred to Waukegan as an inspector. In 1919 he became chief clerk at Waukegan. Mr. Sedwick was appointed superintendent of District E (Crystal Lake) in 1921, where he remained until 1922, when he was transferred to the general office as secretary of the budget and expense committee. Then he was appointed assistant to vice-president in charge of operations and in 1933 he was appointed general district manager. This title was changed to general division manager later in the year.

G. T. SHOEMAKER, who resigned in 1938 as vice-president of the Kansas City Power and Light Company, will return to the company in the near future as vice-president in charge of power production. Mr. Shoemaker resigned to take an emergency appointment as president of the United Light and Power Service Company, a subsidiary of the United Light and Power Company.

G. M. MILLER, formerly superintendent of electrical distribution and construction, Louisville Gas and Electric Company, Louisville, Ky., has been appointed electrical engineer of the company. J. F. MILLER, formerly assistant superintendent of electric distribution, has been made superintendent and V. L. MCKINLEY, formerly meter engineer, has be made assistant superintendent. M. S. WINSTANDLEY has been appointed electrical construction engineer and C. M. EWING assistant superintendent of electrical production.

Maryland Association Spring Meeting

THE Spring Meeting of the Maryland Utilities Association will be held at the Lord Baltimore Hotel, Baltimore, Maryland, on Friday, April 5, 1940. In the morning, there will be separate meetings of the Gas, Electric and Transportation Groups, with addresses by specialists in each of these industries. In the afternoon, there will be a combined session featuring discussions of the personnel and public relations aspects of the utility business.

Temperature Measurement

(*Continued from page* 114)

8. The use of a thermocouple eliminates errors which occur with thermometers which have to be read with the oven door open. There is always some drop in temperature between the time the door is opened and the time the reading is taken.

9. The Thermosheet is the easiest to use of any of the various methods. It is certainly far easier to install than five thermocouples.

10. When the Thermosheet is used with a recording instrument, a permanent record of the oven temperature is obtained automatically.

The Thermosheet has already been adopted by several large manufacturers of electric ranges, and also by a number of utility companies and testing agencies. All indications are that they have found the Thermosheet a practical and satisfactory standardized method for accurately measuring oven temperature. If all agencies would adopt the same method, the already high standards of excellence and uniformity which electric range ovens now enjoy, would be greatly enhanced. Electric cooking in the home would then more closely approach the absolute perfection which electric range manufacturers, electric utilities, dealers, home economists, and food vendors are all sincerely striving for.

M.K.B. Program

(*Continued from page* 117)

case of the other pieces, space is provided for signature and special offers. It sells for $2.50 per 100.

Any of these materials will help you to stimulate consumer interest in kitchen planning. Kitchen planning, in turn, inevitably stimulates an interest in owning a modern electric kitchen. And this interest means appliance sales. The sooner you start these promotional booklets, leaflets, folders and placards working for you, the sooner you will enjoy the benefits they bring to your load building program.

CONVENTIONS AND MEETINGS

APRIL

5 Maryland Utilities Association, Lord Baltimore Hotel, Baltimore, Md.
9-10 Midwest Power Conference, Palmer House, Chicago, Ill.
11-12 American Gas Association, Accounting Section, The Greenbrier, White Sulphur Springs, W. Va.
15-16 Arkansas Utilities Association Convention, Eastman Hotel, Hot Springs National Park, Ark.
16-18 11th Annual Greater New York Safety Council Congress, Hotel Pennsylvania and Hotel Governor Clinton, New York, N. Y.
17-19 Missouri Association of Public Utilities, Elms Hotel, Excelsior Springs, Mo.
25-26 National Power Sales Conference, Hotel Roanoke, Roanoke, Va.
25-26 Missouri Valley Electric Association, Spring Accounting Conference, Continental Hotel, Kansas City, Mo.
29-May 2 Chamber of Commerce of the U. S. A., Washington, D. C.

MAY

1-3 American Society of Mechanical Engineers, Spring meeting, Worcester, Mass.
6-9 Technical Committees, E.E.I., Edgewater Beach Hotel, Chicago, Ill.
8-11 National Fire Protection Association, Atlantic City, N. J.
9-11 Southeastern Electric Exchange, Hotel Roanoke, Roanoke, Va.
12-17 National Electrical Manufacturers Association, The Homestead, Hot Springs, Va.
14-17 National District Heating Association, French Lick Springs Hotel, French Lick Springs, Ind.
19-23 National Electrical Wholesalers Association, The Homestead, Hot Springs, Va.
22-24 Pacific Coast Electrical Association, Hotel Oakland, Oakland, Calif.
24-28 Westinghouse Agent-Jobbers Association, The Homestead, Hot Springs, Va.

JUNE

3-6 EDISON ELECTRIC INSTITUTE, Atlantic City, N. J.
3-6 National Association of Purchasing Agents, Cincinnati, Ohio.
24-27 National Association of Cost Accountants, St. Louis, Mo.

SEPTEMBER

4-6 Pennsylvania Electric Association, Bedford Springs Hotel, Bedford Springs, Pa.
9-12 Illuminating Engineering Society, Essex and Sussex Hotel, Spring Lake, N. J.
25-27 Indiana Electric Association, French Lick Springs Hotel, French Lick Springs, Ind.
26-27 The Empire State Gas and Electric Association, Westchester County Club, Rye, N. Y.

Publicly Owned and Private Utilities

An editorial in Appleton, Wisc., *Post Crescent*

"The decision of Circuit Judge Severson at New London that a city operating an electric utility was not responsible in damages for the neglect of its employees will, if sustained, set out again in bold relief the great difficulty of creating accurate yardsticks to measure the advantages of the two utility systems.

"The jury fixed the damages suffered by the parents for the death of their son, who was electrocuted by a broken live wire, at $4,760 but for the particular neglect existing in this case demand was made for treble damages under the act of the legislature ordering such amount in certain cases. A judgment for $14,280 is no fun for anyone who has to pay it.

"Of course if municipally owned utilities are not made to respond in damages for injuries under the same circumstances as privately owned utilities we have a material distinction to which we cannot shut our eyes.

"And yet this sort of distinction runs through all the affairs of the two forms of utility ownership. No city owned plant will ever have to face the legislative hostility the others have. This is plain enough in the treble damage laws that have been passed to bite deep into the operating utility although its only fault may have been some oversight of a trusted employee. When a city employee overlooks a duty that may mean a live wire pouring out death to the unwary it is too bad, of course, but let the same misfortune occur to a privately owned utility and the language has not sufficiently burning words to fitly characterize the infamy. Even paying for the damage done, with all the generosity shown by juries in such cases, is not enough. The damages must be multiplied by three.

"The public should welcome a clear and minute report by a disinterested commission pointing out all the many distinctions between the two utilities since it is plain that these distinctions in numerous cases are of major importance."

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